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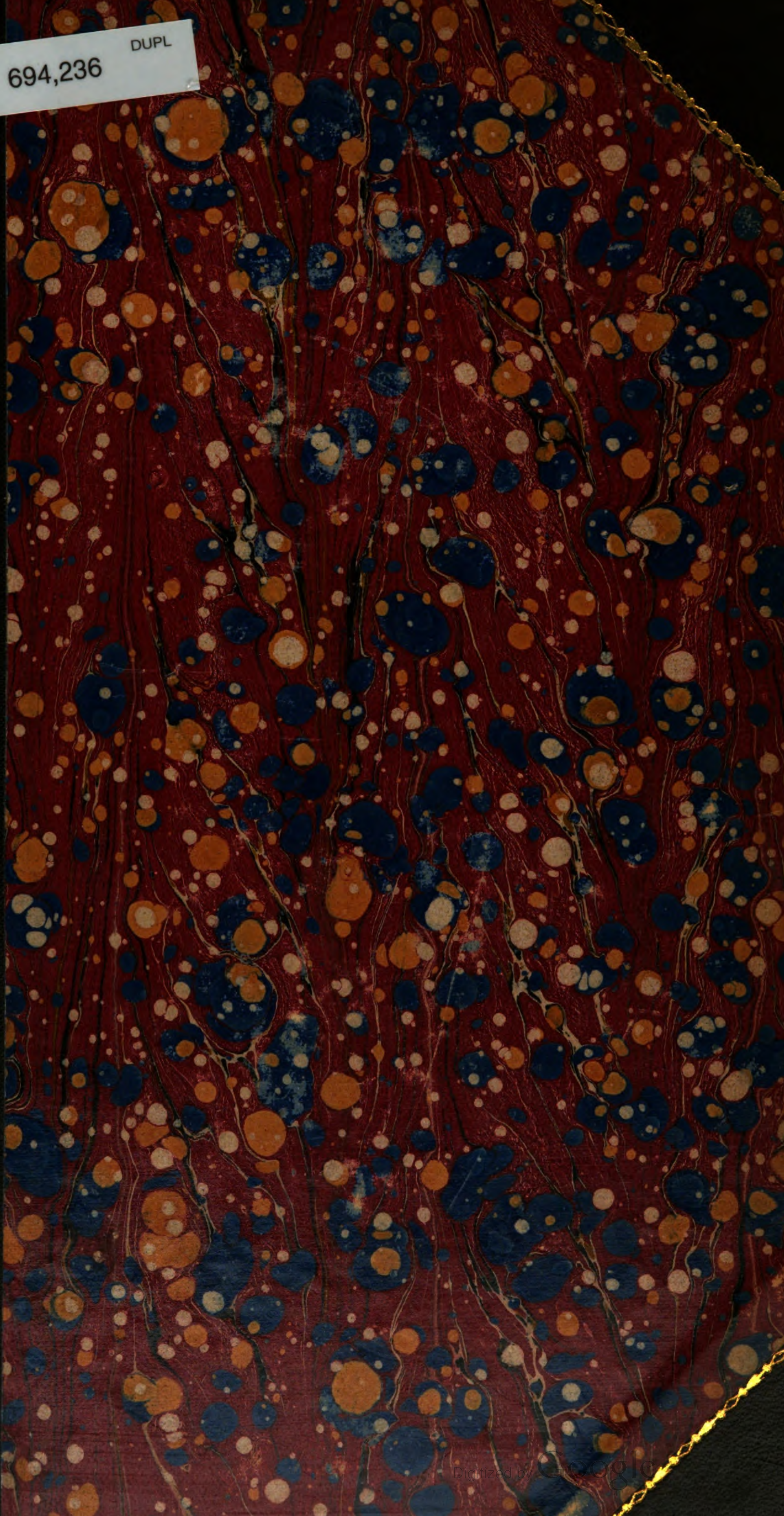

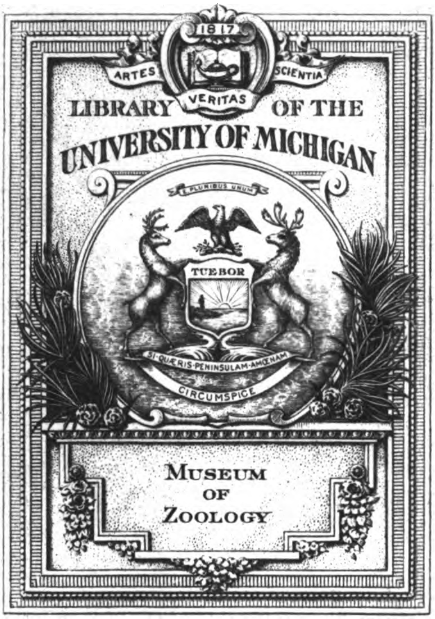

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1903. VOL. XVII. 1903.

THE

TTAWA NATURALIST,

Being Vol. XIX. of the

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1903.

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THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, APRIL, 1903. No. 1.

THE REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR THE YEAR ENDING MARCH 17TH, 1903.

The total membership of the Club is at present 262, of which 254 are ordinary members and eight corresponding.

Mr. W. T. Macoun represented the Club at the meeting of the Royal Society of Canada held in Toronto in May, and read a report on the work done by the Club during the year.

SOIRÉES.

Seven soirées were held during the winter, the lectures arranged for by the Soirée Committee covering a great variety of subjects. The programme was published on page 210 of THE OTTAWA NATURALIST.

These lectures were delivered as arranged except the last two. Professor E. E. Prince being ill was not able to be present, and Mr. Andrew Halkett kindly undertook to explain the slides, so that the lecture was not postponed. The last part of the programme had to be dispensed with (Mar. 17th) as Dr. Ami was absent from the city. The lecturers were all residents of Ottawa except Professor D. P. Penhallow of McGill University, Montreal. The Council is pleased to be able to report that the whole course has been well attended by appreciative audiences.

EXCURSIONS.

Sub-excursions on Saturday afternoons were arranged for April 12th, 19th and 26th and May 3rd, 10th and 31st. The first and third of these were not held on account of rain. On April 19th about 175 members and friends met at Aylmer and collected the Mayflower (*Epigæa repens*) and other plants, also insects and rock specimens. A similar excursion was held on May 3rd to Beaver Meadow, west of Hull, Que., when fifty attended. Rideau Park, a new locality, was visited May 10th when forty or fifty members were present. Many plants were found but unfortunately the frost of the previous night had destroyed most of them. Considerable interest was taken in the boulder clay and Utica shale of this locality. Autumn sub-excursions were also held at the end of August and through September to Hull, Aylmer, Rockliffe and the Montreal Road, principally by the botanical and entomological branches. Roots of native violets and other perennial plants were collected. Sub-excursions were held by the entomologists to collect moss for sifting for insects in October, and a list of fifty-one species of beetles was made as well as representatives of some other orders of insects.

Two general excursions were held during the summer to Chelsea. The first on May 17th, when 250 members and friends of the Club attended, and the second on September 6th, when about 200 were present. Both excursions were highly successful.

THE OTTAWA NATURALIST.

THE OTTAWA NATURALIST has been published regularly under the continued editorship of Mr. James M. Macoun. Volume XVI has been completed, consisting of twelve numbers which contain 248 pages and four plates. Uncoloured copies of the Geological Map of the city of Ottawa and vicinity were purchased from the Geological Survey Department for distribution with the December number of THE OTTAWA NATURALIST to all Canadian members of the Club. This map is on the scale of one mile to an inch and covers an area of over twenty miles square. Some copies which remain may still be purchased from the treasurer.

The following are some of the more important papers published during the year :

Birds of Sable Island, N.S.; Canadian Hummingbirds, by W. E. Saunders.

Five New Ranunculi; New Northwestern Plants, by Edw. L. Greene.

Marl Deposits of Eastern Canada, by R. W. Ells.

On the Nepheline Rocks of Ice River, B.C.; Dr. Alfred R. C. Selwyn, C.M.G., F.R.S., Director Geological Survey of Canada, 1869-1894, by A. E. Barlow.

On the Genus Arctophila, by Dr. Theo. Holm.

Notes on some Fresh-water and Land Shells; Description of a Fossil Cyrena ; On the Genus Trimerella, by J. F. Whiteaves.

Notes on the Arboretum and Botanic Gardens, Central Experimetal Farm, by W. T. Macoun.

Notes on Some Canadian Birds, by Wm. H. Moore

Nesting of Some Canadian Warblers (two parts). by Wm L. Kells.

Field Notes on the Geology of the country about Chelsea, Que., H. M. Ami.

Observations on Animals Native in the Algonquin Park, by Andrew Halkett.

The Educational Value of Nature Study, by A. E Attwood.

Notes on the Size of Hawks' Eggs, by J. E. Keays.

Contributions to Canadian Botany No. XVI, by James M. Macoun.

Ottawa Satyrinæ, A E. Richard.

Besides these there are numerous short papers on scientific subjects, reports of soirées and excursions and of the work done by the various branches of the Club, and reviews of scientific books.

REPORTS OF BRANCHES.

The Geological Branch did not present any formal report this year as Dr. Ami's paper, which was on the programme for the last soirée, would have covered the same ground. The branch, has, however, continued its work, and leaders in this subject have attended all the excursions and explained the salient geological features of the places visited. Part of the skeleton of a large fish, probably a salmon, was found in a calcareous nodule at Besserer Grove and is now in Dr. Ami's possession.

The Botanical Section reports a most successful year's work. The botanical sub-excursions were well attended, several species new to this region were discovered and many new localities found for rare species The more active botanical workers have met twice a month for the purpose of discussing methods of work and other matters of interest, and it is expected that these meetings will result in a more systematic prosecution of botanical work in the vicinity of Ottawa.

The Entomological Branch reports a continuance of useful work both in the field and in the study. Many additions were made during the year to our faunal lists, especially in the order Lepidoptera, and the life histories of many species have been ascertained by breeding specimens. The branch has been holding fortnightly meetings during the winter, with a satisfactory attendance, and the proceedings have been both interesting and profitable to the members. The quickened interest in the subject will doubtless result in increased collecting during the coming season, and of greatly enlarged knowledge of our insects and their habits.

The Ornithological Branch reports that although there was a fair amount of interest manifested in the study of birds there were few who did much systematic work. The dates of arrivals of birds were recorded as usual by several of the members. An interesting feature of the report is the list of birds which breed at the Central Experimental Farm. When the farm was taken over by the Government in 1886, comparatively few birds bred there, but the planting of the trees in the belts and ornamental grounds has increased the number to thirty-eight, THE OTTAWA NATURALIST was well supplied with ornithological notes but unfortunately few of these were written by local members.

The Report of the Zoological Branch recommends the study of the smaller mammalia as likely to afford a useful field of research. This would embrace insectiverous mammals, such as moles and shrews ; rodents, such as mice, voles and squirrels ; and cheiropterous mammals, or bats. A black squirrel and a silver fox were mentioned as having been recently exhibited alive in shop windows on Sparks street. In regard to batrachians the observations of Mr. W. S Odell concerning *Spelerpes bilineatus* were referred to and Mr. Andrew Halkett exhibited at the meeting at which the report was read three living so-called mudpuppies. The principal part of the report deals with the collecting of representative Canadian fishes during the past season as a nucleus of a new collection for the Department of Marine and Fisheries, and cites examples belonging to the four great groups into which the fishes of the Dominion are divisible.

The treasurer reports a balance on hand of $41.73.

The Council desires to express its gratification at the honors recently paid two of the members of the Club in the awarding by Cambridge University to Dr. Robert Bell, the President, of the degree of Doctor of Science, and in the granting of the Bigsby Medal to Dr. H. M. Ami, a former president, by the Geological Society of London.

The Council desires to place on record its sense of the loss which the Club has sustained through the sudden death of Dr. J. A. MacCabe, late principal of the Normal School, who for many years was a member of the Club. The Club was much indebted to him for the frequent use of rooms for meetings and for the permanent use of a room for the library. His genial presence and inspiring addresses added much to the interest of the meetings which he attended.

The thanks of the Club are due to Mr. J. F. White, M.A , the present Principal of the Normal School, for continuing to us the privileges we now enjoy ; also to the daily newspapers of the city for kindly inserting notices of our meetings free of charge.

Respectfully submitted.

W. J. WILSON,
Secretary.

THE OTTAWA FIELD-NATURALISTS' CLUB.

The Treasurer's Statement for the year ending March 17, 1903.

RECEIPTS.		
Balance from previous year		$129 28
Subscriptions, 1902-03	$136	
Arrears	62	
		198 00
Advertisements		42 25
OTTAWA NATURALISTS sold		1 30
Maps of Ottawa sold		20
Government grant		200 00
		$571 03

EXPENDITURE.		
Printing OTTAWA NATURALIST, 12 numbers, 248 pp.	$295 00	
Illustrations	29 37	
Authors' extras	33 55	
Miscellaneous printing, wrappers, post cards, etc.	19 68	
	377 60	
Postage	24 79	
Editor	50 00	
	452 39	
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Geological Survey Dept., 500 copies of Map of Ottawa		16 74
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Examined and found correct.

J. BALLANTYNE,
R. B. WHITE, } Auditors.

ARTHUR GIBSON,
Treasurer.

March 17, 1903.

MAILING LIST.

The Publishing Committee is preparing a new mailing list, and members of the Club and subscribers to THE OTTAWA NATURALIST are requested to advise either the Secretary or the Treasurer of any changes that have been made in their addresse . It is the desire of the Publishing Committee to make the mailing list as nearly correct as possible, and in order to do this they must be aided by those who have not received the Club journal regularly.

YUKON HEPATICÆ.

ALEXANDER W. EVANS.

(With Plates I and II.)

Our knowledge of the hepaticæ occurring in the Territory of Yukon is based on two collections. The first was made by Mr. R. S. Williams in 1898, the second by Professor John Macoun in 1902. Mr. Williams's collection was reported upon by Dr. Marshall A. Howe,[1] who listed twenty-four species. One of these species, however, determined from gemmiparous material, is somewhat doubtful and two additional species have since been detected among Mr. Williams's specimens, so that twenty-five are now definitely known from his collection. Of these twenty-five species, fifteen came from Dawson, while the remainder were collected south of the sixtieth parallel and should not therefore, strictly speaking, be included among the hepaticæ of Yukon. Professor Macoun's entire collection was made in the vicinity of Dawson and is composed of thirty-six species, including all except two of those found by Mr. Williams in the same region. At present, therefore, thirty-eight species are known with certainty from Yukon Territory. All of these species have a wide distribution at high latitudes and many of the more common ones are found in temperate regions also. Upon comparing the Yukon species with those found in other arctic countries where the hepaticæ are fairly well known, we find that all except two have been recorded from Norway, all except six from Siberia, all except eight from Greenland, and all except fourteen from the adjacent Territory of Alaska. Eighteen of the species are known from all four of these regions, and it is probable that others have a like circumpolar distribution. Twenty-five of the Yukon species are known from the United States.

Two of the species in Professor Macoun's collection, *Jungermannia Sahlbergii*, Lindb. & Arnell, and *Lophosia Kaurini* (Limpr.) Steph., have not before been recorded from America. The first of these is of especial interest. It was originally described from material collected in the Jenisei region of Siberia. In spite of its strong superficial resemblance to *Lophozia Rutheana*, Lindberg recognized its distinctness and made it the type of his section *Mesoptychia*. Schiffner afterwards raised this section to subgeneric rank under *Lophozia*. The Yukon specimens, however, which are more complete than those originally found, show conclusively that *J. Sahlbergii* should be considered the type of a distinct genus, for which Lindberg's appropriate sectional name may be retained. In the following ennumeration the numbers quoted refer to the specimens collected by Professor Macoun.

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[1] Bull. New York Bot. Garden, 2^6 : 101-105, *pl. 14.* 1901.

Marchantiaceæ

1. ASTERELLA FRAGRANS, (Schleich.) Trevis.
   Hunker Creek (61).

2. PREISSIA QUADRATA, (Scop.) Nees.
   Hunker Creek (62).

3. MARCHANTIA POLYMORPHA, L.
   Dawson (1); West Dawson (Williams).

Metzgeriaceæ.

4. RICCARDIA PINGUIS, (L.) S. F. Gray.
   Dawson (5); Bonanza Creek (85).

Jungermanniaceæ.

5. GYMNOMITRIUM CORALLIOIDES, Nees.
   Indian Divide (98).

6. NARDIA SCALARIS, (Schrad.) S. F. Gray.
   Dawson (Williams).

7. ARNELLIA FENNICA, (Gottsche) Lindb. Meddel. Soc. F. et Fl. Fenn. 14 : 70. 1887. Lindb. & Arnell, Kongl. Sv. Vet. Akad. Handl. 23^5 : 35. 1889.

Jungermannia Fennica, Gottsche ; G. & R. *Hep. Eur.* 418. 1868.

Southbya Fennica, Gottsche, *l. c.*

Hunker Creek (64 *p.p.*); Dawson (Williams), a few fragments only, not listed by Howe. A widely distributed species, now known in the Old World from Norway, Sweden, Finland, Italy and Siberia. In North America the species has been previously collected by Dusén in Greenland, and by

Macoun at Lake Manitoba and in the Rocky Mountains of British Columbia.

MESOPTYCHIA, (Lindb.) gen. nov.

Jungermannia, B. *Eujungermannia*, b *Mesoptychia*, Lindb.; Lindb. & Arnell, Kongl. Sv. Vet. Akad. Handl. 23^6 : 39. 1889.

Lophozia, subgenus *Mesoptychia*, Schiffn.; Engler & Prantl, Die natürl. Pflanzenfam, 1^3 : 85. 1893.

Stem simple or sparingly branched, sometimes with subfloral innovations: rhizoids numerous: leaves alternate, succubous, more or less deeply bilobed and longitudinally folded at about the middle; antical lobe convex; postical lobe concave; underleaves deeply bifid with ciliate divisions: leaf-cells with distinct trigones and verruculose cuticle: ♀ inflorescence terminal on a stem or leading branch; bracts and bracteoles similar to the leaves and underleaves, more or less adnate to the perigynium; perianth free with two rounded lateral keels and a sharper antical keel (*i.e.* epigonianthous), contracted and short-ciliate at the mouth; perigynium pendent at right angles to the axis, cylindrical, with numerous scattered rhizoids, smooth inside; calyptra fleshy, covering the whole of the sporophyte except the foot and bearing the unfertilized archegonia at its base: ♂ inflorescence intercalary on a stem or leading branch; bracts similar to the leaves but often with a small tooth-like or sac-like lobe at antical base; paraphyses (when present) in the form of minute filamentous or subulate hairs; bracteoles similar to the underleaves: young sporophyte of the ordinary jungermanniaceous type, divided into capsule, stalk and foot, the last being bluntly conical and extending around the base of the stalk as a narrow collar; mature capsule unknown.

8. MESOPTYCHIA SAHLBERGII, (Lindb. & Arnell).

Jungermannia Sahlbergii, Lindb. & Arnell, *l. c.* 40.

Lophozia Sahlbergii, Schiffn. *l. c.* 85.

Robust, brownish-green or reddish, growing in loose tufts: stems slightly flattened, 0.8 mm. wide, 0.4 mm. thick on well developed individuals : rhizoids yellowish to reddish : leaves imbricated, obliquely inserted, widely spreading, very broadly orbicular, 1.9 mm. long, 3 mm. wide, antical lobe often a little smaller than the postical, broadly ovate, slightly decurrent, antical margin rounded, apex rounded to subacute, usually terminating in an apiculum consisting of a row of from one to four cells ; sinus (in explanate leaves) varying from obtuse to broadly and shallowly lunulate or truncate ; postical lobe orbicular, postical margin rounded, sometimes subcordate at base, more rarely short-decurrent, apex rounded to obtuse, sometimes apiculate ; margin repand, indistinctly crenulate from projecting cells, sometimes bearing one or two short teeth at about the middle of the antical lobe or near the postical base ; leaf-cells at the edge of leaf 0.025 x 0.021 mm., in the middle isodiametric, averaging 0.031 mm., slightly elongated at the base, trigones slightly bulging into cell-cavities ; verruculæ of cuticle densely crowded, oval or circular in outline : underleaves with lanceolate or subulate long-attenuate divisions, each 1.4 mm. long, 0.17 mm. wide; marginal cilia six to fifteen on each division, mostly two to twenty cells long and one to five cells wide at base ; cells of underleaf with more uniformly thickened walls than in leaf, trigones indistinct, cuticle verruculose : inflorescence dioicous; ♀ bracts alternate in about three pairs, the innermost quadrate, 2 mm. long, with sharper lobes than in the leaves, both antical and postical commonly apiculate, marginal teeth more usual than on ordinary leaves: innermost bracteole often torn in two and carried down by the developing perigynium ; perianth ovate in outline, 2.7 mm. long, 1.4 mm. in diameter, one cell thick, irregularly lobed at the contracted mouth, the lobes short-ciliate on their margins with cilia from one to four cells long and one cell broad throughout ; perigynium cylindrical, hollow, rounded at the apex, 3 mm. long, 1.4 mm. in diameter, the wall about ten cells thick (0.25 mm.), somewhat thinner toward junction with perianth : calyptra about five cells thick (0.15 mm.) over capsule, thicker in lower part; archegonia usually ten to sixteen : antheridia few in the axil of each ♂ bract. (*Plate I.*)

Hunker Creek (51, 57); Dawson (Williams), not listed by Howe. New to America. Previously recorded from Siberia only. The Yukon material has been compared with Siberian specimens kindly communicated by Dr. Arnell.

The genus *Mesoptychia* is allied to *Lophozia* and also to *Acrobolbus*, both of which have succubous, alternate and variously lobate leaves. It is distinguished from the first of these genera by the possession of a perigynium and from the second by the possession of a perianth. The perigynium of *Mesoptychia* is further distinguished from that of *Acrobolbus* by being hollow and by carrying down with it, as it develops, the unfertilized archegonia. The occurrence of both perianth and saccate perigynium in the same plant is a most remarkable feature but is not entirely unique, for we find it duplicated in *Arnellia*. In this genus, however, the leaves although succubous are undivided and opposite, coalescing in pairs at their antical bases, and the underleaves are simple. In the genus *Gyrothyra* as well as in *Nardia hæmatosticta* and the allied *N. Breidleri*, we also find a certain approach to the condition described for *Mesoptychia*. In these plants the end of the female branch becomes fleshy after fertilization and forms an erect perigynium, which encloses the developing sporophyte. On the outside of this fleshy perigynium are borne the perichætial bracts and at its mouth the rudimentary perianth. The lower part of the perigynium extends downward as a small solid bulbous enlargement, into which the foot of the sporophyte penetrate more or less deeply. In *Gyrothyra* the unfertilized archegonia remain near the mouth of the perigynium, somewhat as in *Acrobolbus*, while in the two species of *Nardia* they are found at the bottom. The most essential difference between the three plants just discussed and *Mesoptychia* lies in the fact that their perigynia are erect, growing upward at right angles to the fruiting axis, while in *Mesoptychia* they are pendent and grow downward. There are of course many other differences drawn from purely vegetative characters.

As in other saccate genera, the development of the perigynium in *Mesoptychia* is dependent upon fertilization. The perianth, on the other hand, is found whether fertilization has taken place or not. So far as observed, innovations are never produced where fertilization has occurred. The leaves of *M. Sahlbergii* exhibit considerable variation but the antical lobe is almost invariably sharper and a little smaller than the postical ; in the perichætial bracts, however, this difference tends to disappear.

9. LOPHOZIA RUTHEANA, (Limpr.) M. A. Howe, Bull. New York Bot. Garden, 2^6 : 102. 1901. (*Plate II.*)

Bonanza Creek (14), also collected by Williams at the same locality; Hunker Creek (46). These are the only known American stations, but the range of the species extends through northern Europe into Siberia.

Two very full descriptions of *L. Rutheana* have already been published, the first being Limpricht's original description,[1] the second Lindberg's description of his *Jungermannia lophocoleoides*,[2] which is now acknowledged to be a synonym of *L. Rutheana.* At the same time the species resembles *Mesoptychia Sahlbergii* so closely, especially when sterile, that it may be well to emphasize the more important differential characters. Of course fruiting specimens are very distinct, and, even in the case of sexual individuals where fertilization has not taken place, the paroicous inflorescence of *L. Rutheana* and the dioicous inflorescence of the *Mesoptychia* may usually be demonstrated without much trouble.

The two species are of about the same size and they resemble each other in color. Both species, moreover, have bifid leaves and conspicuous underleaves and both show distinct trigones in their leaf-cells and a strongly verruculose cuticle. In *L. Rutheana*, however, the leaves are not folded and are sometimes gibbous at the bottom of the sinus. The apices of the lobes are very variable, being sometimes rounded, sometimes obtuse and sometimes acute, but they are rarely or never distinctly apiculate. If there is any inequality in the size of the lobes or any difference in their apices, it is the postical lobe which is smaller and more sharply pointed, just the opposite of what we find in *Mesoptychia Sahlbergii.* The leaf-cells of *L. Rutheana* average 0.023 x 0.032 mm. at the margin of the leaf, 0.055 x 0.030 mm. in the middle and 0.055 x 0.039 mm. near the base. They are therefore a little larger than in the *Mesoptychia* and are more distinctly elongated in the median and basal portions of the leaf. The trigones of the two species are similar, but the verruculæ the cuticle of *L. Rutheana* are fusiform in shape, rather than oval or circular, and lend the leaf-surface a distinctly striated appearance. The underleaves of *L. Rutheana* are much more variable than in *Mesoptychia Sahlbergii.* They are occasionally bifid but are more commonly trifid to quinquefid with the median division distinctly larger than the others. The divisions are lanceolate and end in long filiform points which are commonly curved in various ways. In some cases one or more of the divisions arise from the surface at the base of the underleaf instead of from the margin. The divisions are often sparingly ciliate, but each one rarely shows more than a half dozen cilia and the latter are shorter and broader than in the *Mesoptychia.*

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[1] Jahresb. Schles. Gesell. vaterl. Cultur, 61 : 207. 1884.

[2] Lindb. & Arnell, Kongl. Sv. Vet. Akad. Handl. 23^5 : 41. 1887.

The perichætial bracts of *L. Rutheana* are broader than long, measuring 2.5 x 3 mm., and commonly show obtuse lobes. The perianth is very large, measuring when mature 5 mm. in length and 1.4 mm. in diameter; its wall is three to five cells thick (0.14 mm.) at the base, two cells thick to about the middle and one cell thick in the upper part. The perianth is gradually narrowed above the middle but is not distinctly beaked nor contracted at the mouth. The latter is minutely setulose, the thick-walled setulæ being two cells long or less. With respect to the folds of the perianth descriptions vary. Lindberg states that it is obtusely trigonous, the third keel being postical, but asserts that while young it is often laterally compressed. Limpricht emphasizes the lateral compression and adds that there is sometimes a shallow groove down one lateral face and a corresponding low ridge down the other, sometimes a groove on each face. He also states that a trigonous perianth with the third keel antical is of occasional but rare occurrence. According to my own experience the compressed perianth is a very constant feature of the species. The perigonial bracteoles of *L. Rutheana* are sometimes, but not always, shorter than the ordinary underleaves.

10 LOPHOZIA KAURINI, (Limpr.) Steph. Bull. de l'Herb. Boissier, II. 1 : 1147. 1901.

Jungermannia Hornschuchiana paroica, Ekstrand, Bot. Notis. 1879 : 36.

Jungermannia (*Lophozia*) *Kaurini*, Limpr. Jahresb. Schles. Gesell. vaterl. Cultur, 61 : 204. 1884.

Jungermannia Muelleri, forma *paroica*, Bernet, Cat. Hép. Sud-Ouest de la Suisse, etc. 68. *Pl. 3*. 1888.

Hunker Creek (44 *p.p.*, 49, 63). New to America. Previously known from Norway, Switzerland and Siberia.

Limpricht's description of *L. Kaurini* and the beautiful figures published by M. Bernet give so clear an idea of the species that only its more important characters will be alluded to here. It agrees with *L. Rutheana* in its paroicous inflorescence, in its bifid leaves and in the possession of underleaves. It is, however, less robust and shows little or no trace of purplish or reddish coloration. The lobes of its leaves are rounded to acute and on slender shoots are not infrequently apiculate ; the sinus is broad, varying from obtuse to lunulate. According to Limpricht obtuse or rounded lobes are to be regarded as the more typical, but acute lobes are about as frequent in the Yukon material. In most cases the lobes are subequal in size, but sometimes the postical lobe is slightly the larger and in such cases tends to be blunter also. The leaf-cells are somewhat smaller than in *L. Rutheana*, averaging 0.035 x 0.025 mm. in the middle of the leaf; the trigones also are less conspicuous, but the cuticle is similarly striate-verruculose. The underleaves are small and are commonly undivided ; they vary from subulate to lanceolate and end in a long attenuate point. Sometimes an underleaf will bear one or two short marginal teeth or occasionally a longer tooth near the base.

The perianth of *L. Kaurini* is clavate in shape and measures 3 mm. in length and 1.4 mm. in diameter. It is terete except when very young, and is abruptly contracted into a short and broad beak with a setulose mouth, the setulæ consisting of single, projecting, thin-walled cells. The character of the perianth shows that the species is related to *L. Muelleri* and its allies.

11. LOPHOZIA HETEROCOLPA, (Thed.) M. A. Howe.

Dawson (2, 6); West Dawson (8); Hunker Creek (29 *p.p.*, 44 *p.p.*, 48, 59, 67, 79, 80 *p.p.*). Also collected by Williams at Dawson. Nos. 29, 79 and 80 are a little doubtful and show an approach to *L. Muelleri* (Nees) Dumort. They are referred to *L. heterocolpa* because they are gemmiparous, and the writer would include under the same species the gemmiparous specimens referred by Howe to *Geocalyx graveolens.*

12. LOPHOZIA VENTRICOSA, (Dicks.) Dumort.

Dawson (34 *p.p.*); West Dawson (7); Indian Divide (93, 101); Hunker Creek (41, 55, 75 *p.p.*); Bonanza Creek (86 *p.p.*).

13. LOPHOZIA WENZELII, (Nees) Steph. Bull. de l'Herb. Boissier, II. 2: 35. 1902.

Jungermannia Wenzelii, Nees, Naturg. der europ. Leberm. 2: 58. 1836.

Hunker Creek (82 *p.p.*). The species is widely distributed in northern Europe and in Siberia. It is also known from Greenland, but has not before been reported from the American mainland.

14. LOPHOZIA INFLATA, (Huds.) M. A. Howe.

Hunker Creek (70).

15. LOPHOZIA FLOERKII, (Web. & Mohr) Schiffn.

Hunker Creek (76, 81).

16. LOPHOZIA BARBATA, (Schreb.) Dumort.

Klondike River bottom (Williams).

17. LOPHOZIA LYONI, (Tayl.) Steph.

Klondike (Williams); West Dawson (84); Indian

Divide (92, 94); Hunker Creek (38, 68 *p.p.*, 83); Bonanza Creek (90).

18. LOPHOZIA BINSTEADII, (Kaalaas).

Jungermannia Binsteadii, Kaalaas, Vid.-Selsk. Skrifter, 1898^{9} : 9.

Dawson (34 *p.p.*); Bonanza Creek (11, 12, 22, 35). Originally described from Norwegian specimens. Recently recorded from Greenland. Determination confirmed by C. Jensen.

The species is close to *L. gracilis* (Schleich.) Steph. but is destitute of flagelliform branches bearing gemmæ. The walls of its leaf-cells also are much more thickened and show very conspicuous trigones. Some doubt is thrown on the validity of the species by C. Jensen,[1] who suggests that it may pass into slender forms of *L. Lyoni*.

19. LOPHOZIA INCISA, (Schrad.) Dumort.

Klondike (Williams); Hunker Creek (53 *p.p.*, 80 *p.p.*).

20. SPHENOLOBUS KUNZEANUS, (Hüben.) Steph.

Hunker Creek (74).

21. SPHENOLOBUS MICHAUXII, (Web.) Steph.

Hunker Creek (25, 53 *p.p.*).

22. SPHENOLOBUS SAXICOLUS, (Schrad.) Steph.

Klondike (Williams); Hunker Creek (54); Gold Bottom Creek (78); Indian Divide (99).

23. SPHENOLOBUS MINUTUS, (Crantz) Steph.

Dawson (Williams); Hunker Creek (26, 27, 40, 50); Bonanza Creek (102); Indian Divide (100).

24. MYLIA ANOMALA, (Hook.) S. F. Gray.

Dawson (Williams); Hunker Creek (72); Bonanza Creek (13, 18, 36).

25. LOPHOCOLEA MINOR, Nees.

Bonanza Creek (88).

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[1] Öfversigt Kongl. Vetensk. Akad. Förh. 1900^{6} : 798.

26. **CEPHALOZIA BICUSPIDATA**, (L.) Dumort.

Bonanza Creek (15); Hunker Creek (75 *p.p.*).

27. **CEPHALOZIA PLENICEPS**, (Aust.) Lindb.

Hunker Creek (32, 60, 65); Bonanza Creek (89).

28. **CEPHALOZIA LUNULÆFOLIA**, Dumort.

Dawson (34 *p.p.*).

29. **CEPHALOZIA LEUCANTHA**, Spruce.

Hunker Creek (71).

30. **ODONTOSCHISMA MACOUNII**, (Aust.) Underw.

Dawson (Williams), listed as *O. Sphagni*; Hunker Creek (24, 52, 58, 90); Bonanza Creek (16 *p.p.*, 20 *p.p.*). Not previously collected in fruit. The species will be fully described in another connection.

31. **KANTIA TRICHOMANIS**, (L.) S. F. Gray.

Hunker Creek (42).

32. **BLEPHAROSTOMA TRICHOPHYLLUM**, (L.) Dumort.

Bonanza Creek (Williams); same locality (10, 19 *p.p.*, 21); Hunker Creek (29, 31, 33, 39, 44, 45 *p.p.*, 48, 61, 66, 73 *p.p.*); Indian Divide (95).

33 **TEMNOMA SETIFORME**, (Ehrh.) M. A. Howe.

Gold Bottom Creek (77).

34. **PTILIDIUM CILIARE**, (L.) Nees.

Dawson (Williams); Hunker Creek (28, 37, 69); Bonanza Creek (87).

35. **DIPLOPHYLLEIA ALBICANS**, (L.) Trevis.

Bonanza Creek (9).

36. **DIPLOPHYLLEIA TAXIFOLIA**, (Wahl.) Trevis.

Bonanza Creek (86 *p.p.*); Indian Divide (96, 97).

37. **SCAPANIA CURTA**, (Mart.) Dumort.

Bonanza Creek (19 *p.p.*); Hunker Creek (30, 43, 64 *p.p.*, 66 *p.p.*).

38. **SCAPANIA UNDULATA**, (L.) Dumort.
Hunker Creek (68, 82 *p.p.*).

Yale University, March, 1903.

EXPLANATION OF PLATES.

Plate I.

MESOPTYCHIA SAHLBERGII, (Lindb. & Arnell) Evans.

Fig. 1. Fruiting stem. × 12.
Fig. 2. Part of stem showing perigonial bracts and ordinary leaves, antical view. × 12.
Fig. 3. A leaf spread out. × 12.
Fig. 4. Cells from middle of leaf, one shaded to show the verruculæ on the cuticle. × 300.
Fig. 5. Underleaf. × 35.
Figs. 6, 7. Perichætial bracts. × 12.
Fig. 8. End of fruiting stem with the bracts removed, showing perianth and perigynium. × 12.
Fig. 9. Longitudinal section through same. × 16.
Fig. 10. Transverse section of perianth. × 12.
Fig. 11. Teeth from mouth of perianth. × 225.
Fig. 12. Perigonial bract. × 12.

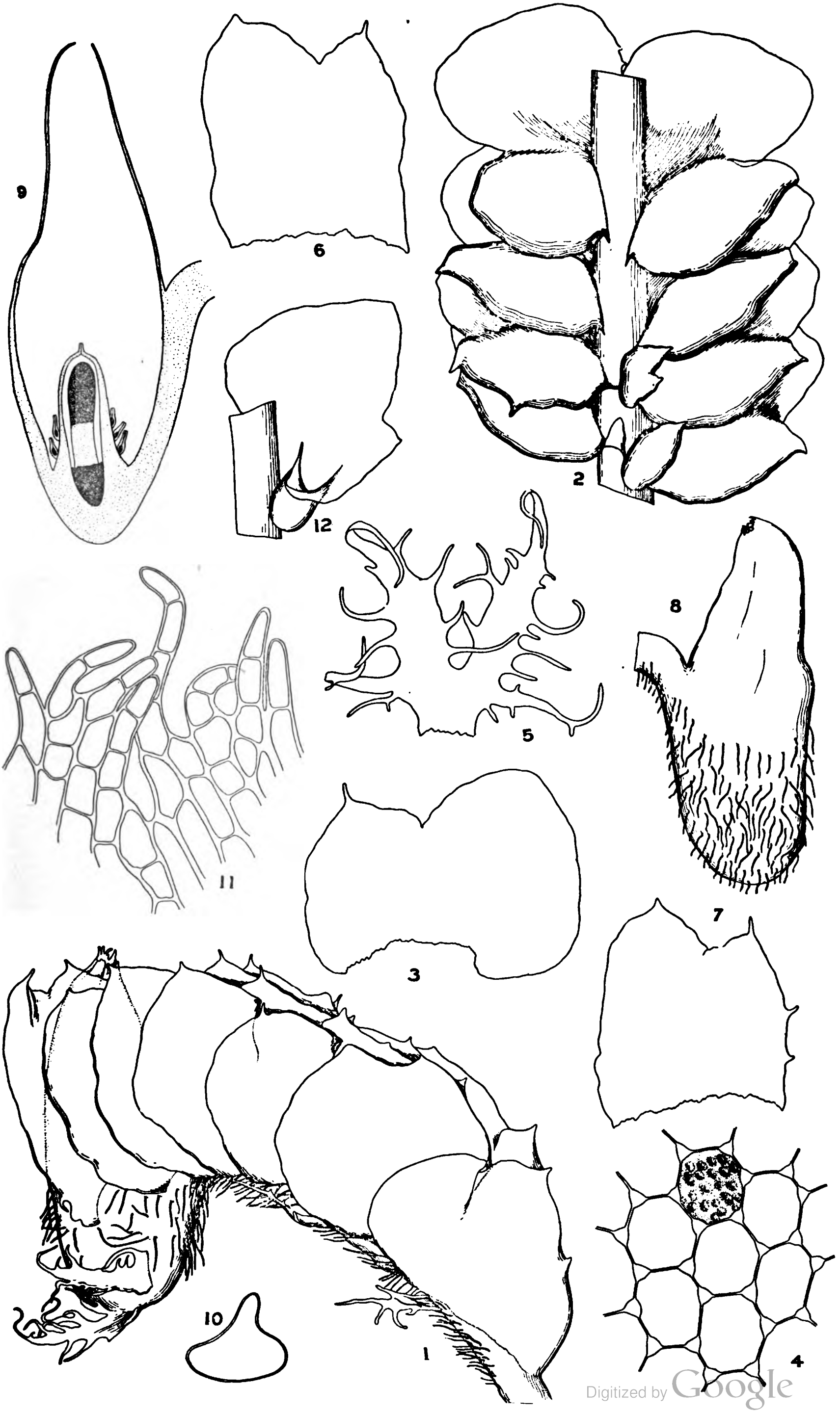
The figures were all drawn from Professor Macoun's No. 57.

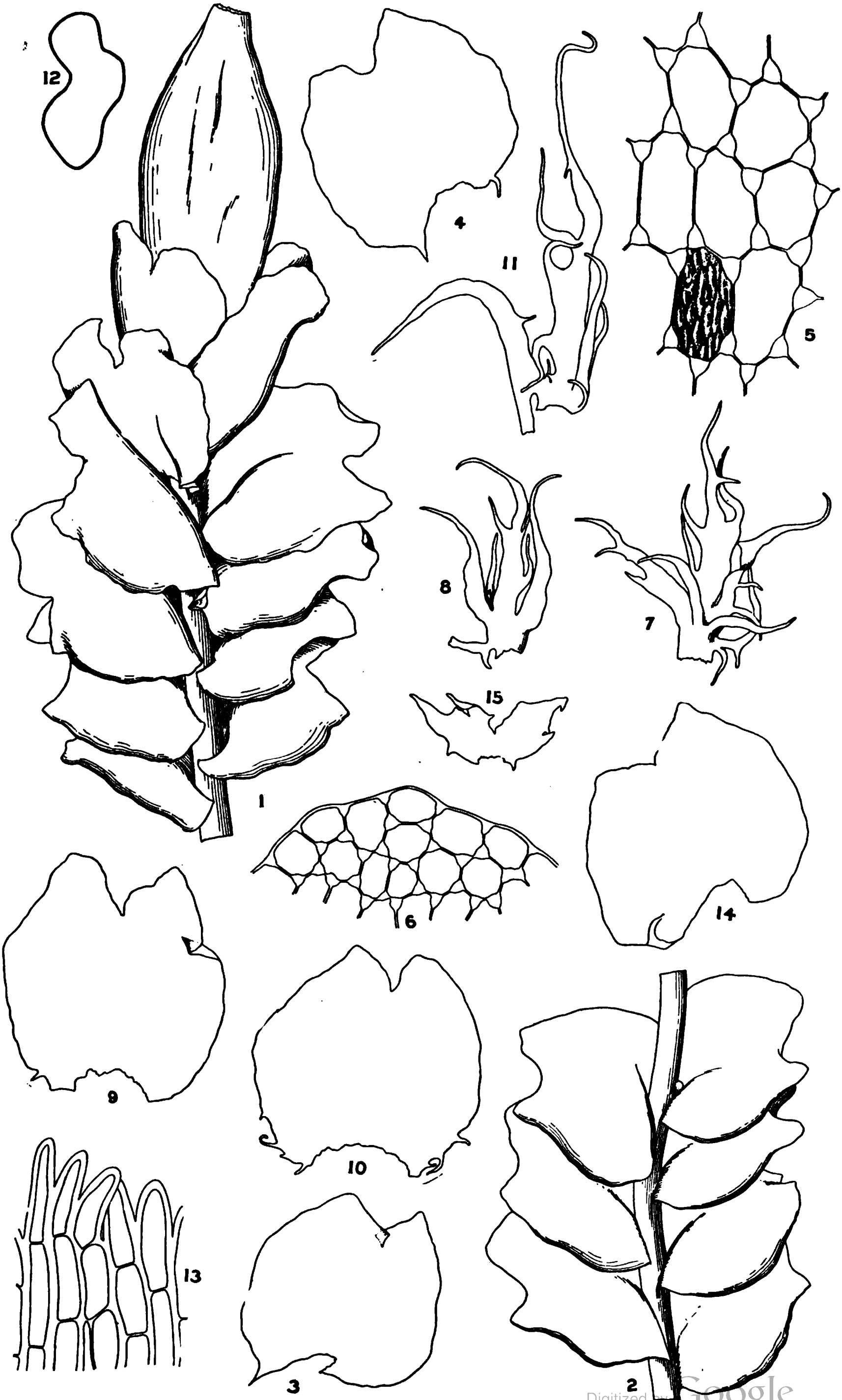
Plate II.

LOPHOZIA RUTHEANA, (Limpr.) M. A. Howe.

Fig. 1. Fruiting stem, antical view. × 12.
Fig. 2. Part of stem showing ordinary leaves and perigonial bract, antical view. × 12.
Figs. 3, 4. Leaves spread out. × 12.
Fig. 5. Cells from middle of leaf, one shaded to show the verruculæ on the cuticle. × 300.
Fig. 6. Cells from apex of antical lobe. × 225.
Figs. 7, 8. Underleaves. × 20.
Figs. 9, 10. Perichætial bracts. × 12.
Fig. 11. Perichætial bracteole. × 20.
Fig. 12. Transverse section of perianth. × 12.
Fig. 13. Teeth from mouth of perianth. × 225.
Fig. 14. Perigonial bract. × 12.
Fig. 15. Perigonial bracteole, more specialized than usual. × 20.

The figures were all drawn from Professor Macoun's No. 14.





Lophozia Rutheana (Limpr.) M. A. Howe.

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THE NESTING OF BIRDS AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

W. T. MACOUN.

The following notes on the nesting of birds at the Central Experimental Farm are not published with the object of encouraging bird nesting at the Farm, for this is prohibited, but to show how many species of birds have been attracted there because they are protected and have found suitable nesting places. This article was written to supplement the report of the Ornithological Branch, which will also be found in this number of THE NATURALIST.

As the trees and shrubs at the Experimental Farm increase in size in the forest belts and on the ornamental grounds there is an increasing number of species of birds which breed there. In addition to that part of the Farm which is under cultivation there is a small area where the natural timber still remains, and a marsh and swamp with tamarac and willows and a few other trees. These places attract quite a number of birds which would not be found if all the Farm were under cultivation. The following observations have been made at the Farm during the past sixteen years, but particular attention was paid to the species breeding there during 1902.

Of the water and shore birds there are several which breed in the swamp and marsh near the canal. Although a nest of the American bittern has not been actually found to our knowledge, these birds are frequently seen in the marsh during the breeding season and undoubtedly breed there. A nest of the least bittern with eggs in it was found by Dr. F. A. Saunders in the summer of 1902 in the marsh. A nest of the sora or Carolina rail was found in the marsh several years ago and it is probable that the American coot breeds there also

Of the shore birds, the spotted sandpiper is the only species which has been found breeding on the Farm. For the past three years a pair has built in the fruit plantations, which are nearly or quite three-quarters of a mile from a pond or stream. In the years 1901 and 1902 the nest was built in the strawberrry plantation, it being placed in the row of plants and well hidden by them. In 1902 the nest was built in the middle of the orchard. The newly hatched young have been found running about in the fruit plantations. Nests have also been found on the high land in the arboretum.

None of the hawks or owls have been found breeding, though it is possible that in the Farm woods near St. Louis dam, the sharp-shinned hawk has had its nest as the nest of this bird has been found just across the canal in Dow's swamp.

The black-billed cuckoo has bred for several years in the forest belts, but in 1901 a nest with eggs was found in an apple tree in a thickly planted part of the orchard. The cuckoo does not build in the open but seeks a secluded place for its nest. It is one of the last birds to arrive and hence breeds late. Its peculiar note in early summer is often puzzling to those not familiar with the habits of the bird.

The only woodpecker which has been found breeding is the flicker. This bird is very common. A nest was found in a hollow basswood stump in the arboretum in 1902, but as the hole was only about six feet from the ground it was easily discovered by boys and robbed. This bird shows little tact in selecting a site for its nest and the large hole which it makes can be seen at a glance.

The nighthawk has been breeding on the Farm for the past fifteen or sixteen years, and several nests have been found. Many eggs must have been destroyed by the horse and cultivator, as the bird will lay its eggs where cultivation must be done. The eggs, which are two in number, are laid in the open in a shallow depression on the ground. The soil which becomes hottest seems to be preferred.

The chimney swift breeds in the chimneys of the houses and comes back regularly every year. It is very seldom that these birds are injured by fire. They do not begin nesting until the furnace fires are out, and they seem to know by instinct, perhaps by the smell of the soot, those chimneys from which smoke is likely to come during the summer and they keep away from them.

While a ruby-throated hummingbird's nest has not actually been taken on the Farm to our knowledge, we believe this bird to breed there as it is very common during the summer. A nest was taken some years ago by Mr. W. E. Saunders in the woods near the Farm.

The kingbird breeds in the orchard in the apple trees, and appears to take no trouble in hiding its nest which is readily seen. It seems to rely on its pugnacity for keeping all intruders away, and certainly it is sometimes alarming to have this little bird crying and darting about. The eggs of the kingbird are very beautiful, in fact among the most beautiful of Canadian birds. The kingbird is, we understand, fond of honey bees and it is difficult to protect its nest if the bee man finds it out.

It is possible that the phœbe has built somewhere in or about the buildings on the Farm, but a nest has never been found to our knowledge. The wood peewee also probably builds in the larger trees.

Among the first birds to arrive is the prairie horned lark, which usually appears during the latter part of February and begins breeding soon after the snow is off the ground. The nest is built on the ground, usually in the open. There must be many pairs breed on the Farm every year. A nest which was found in the arboretum a few years ago was built in the ground close to a large dandelion.

The crow remains here all the year round and is frequently seen during the winter months. It breeds early in spring in the large pine trees.

Bobolinks are fairly common in the meadows, but their nests are hard to find and few of them are seen. It is one of our finest singing birds, and it is fortunate that their nests are difficult to discover, as boys have no discrimination. The cowbird, which is closely related to the bobolink, is about as useless a bird as the latter is valuable. What useful part this bird plays in the economy of nature is difficult to imagine. As is well known it builds no nest of its own but lays an egg here and there in the nests of other birds smaller than itself. The poor little chipping sparrow appears to be the commonest sufferer. The young cowbird outgrows the lawful heirs of the nest and soon monopolizes it. It must keep the faithful mother busy satisfying the stomach of this voracious intruder.

The red-winged blackbird is quite common in the marsh at St. Louis dam and breeds there regularly. These birds fly over the high land well into the arboretum, probably after some kind of food.

Every year a few pairs of meadow larks breed, and as their nests are hard to find they usually rear their young. The meadow lark arrives early in the spring and its peculiar notes are readily recognized.

The Baltimore oriole is closely related to the meadow lark, but the habits of the birds are very different. As is well known, the hanging nest is built near the end of a pendulous branch and as large trees are usually chosen the nest is fairly safe from being robbed, though, we regret to say, boys with catapults sometimes play sad havoc with them. The oriole builds in the large elms at the Farm.

One of the noisiest birds is the bronzed grackle, which is also among the first arrivals in the spring. It builds in the large pine trees.

Although the purple finch does not breed in large numbers several nests have been found at the Farm. This is not a shy bird and a nest has been found within one hundred feet of one of the residences at the Farm. The white spruce appears to be the favourite tree, and the nest is built from fifteen to twenty feet from the ground. The female is quite tame when brooding, and one can approach quite close to the nest without disturbing her. A rare nest of the American goldfinch has been found late in the season and it is probable that quite a number of pairs breed at the Farm, but they breed late when few are looking for nests.

The European house sparrow is closely related to the American goldfinch. This bird begins to breed early and continues late, and it is difficult to tell how many broods are raised in a season. The nests are built in holes, corners and cracks in the buildings.

There are probably more nests of the vesper sparrow on the Farm in one season than any other species not even excepting the house sparrow. Many nests are found every year, and many nests must be destroyed by the plough and other farm implements. The nest is built on the ground and usually has some partial protection in the form of growing grass or weeds Although no nests of the Savanna sparrow have been found to our knowledge this bird must breed on the Farm, as it is seen there during the summer. The white-throated sparrow's nest has not been found either, but this bird probably builds in the natural woods on the Farm.

There are none of the small birds which are more associated with the home than the chipping sparrow. This little fellow seems to delight in building his nest near the house and will, if possible, choose a shrub or tree almost if not quite against a building. The nest never seems to be firmly fixed to the branch on which it is resting, and there are probably more capsized chippy's nests after a rain or wind storm than any other species.

The slate-coloured junco may breed on the Farm but a nest has not been found.

The song sparrow is quite common but the nest is not as easily found as either the vesper or chipping sparrow. The nest of the vesper sparrow it found by the bird rising almost under one's feet, while the nest of the chipping sparrow is very easily seen in the shrub or tree where it builds. The song sparrow usually builds its nest in dense shrubs or on the ground, but not often in an open position, and hence it is more difficult to find, though the nests are quite common.

The swamp sparrow's nest has not been found, but it probably breeds in the swamp and marsh near St. Louis dam and the canal.

In 1895 a dicksissel spent the summer at the Farm and probably a pair were breeding in the meadow where the male bird was seen constantly for some days. This was the first and last record of this bird as it does not as a rule come to Eastern Ontario.

The only swallow which is known to breed on the Farm is the barn swallow. A few pairs breed in the barns, but the house sparrows occupy most of the available sites for nests. A pair started to build under the verandah of one of the houses in 1902 but they gave it up, though we cannot say for certain that the house sparrow was responsible for this.

During the last days of June and the beginning of July the cedar waxwings are busy breeding. This species breeds very late and is still seen in flocks during the latter part of June. The nest is very easy to find as it is built in rather open trees from six to ten feet from the ground. A Chinese maple (*Acer tataricum*, var. *Gennala*) is a popular tree, and among the many species on the grounds this appears to be preferred. It is unfortunate that this bird does not breed about two weeks earlier, as when a flock swoops down on a cherry tree or strawberry plantation a great deal of damage is done.

For the past three years, and perhaps more, the northern shrike has built regularly at the Farm. In 1902 the nest was found on May 19th, with six eggs in it, a short distance from that of 1900. The nests were found in elm trees about fifteen feet from the ground. The brood of 1900 was successfully raised by the old birds and it was an interesting sight to see the fully fledged young fighting for their food. They made a great din, the harsh notes of the old birds rising above their offspring. Some of the notes of the shrike are very pleasant to listen to while others are as bad or worse than those of the blue jay. Frequently we find grasshoppers empaled by these birds on the spurs of the fruit trees in the orchard. There has been some confusion regarding the identity of the shrike which breeds here, but it is certainly the northern shrike.

A red-eyed vireo had its nest somewhere in one of the large maples in the orchard enclosure in 1902, but the exact site was not located.

There are probably several warblers breed in the woods and swamp near the canal and St. Louis dam the nests of which have not been discovered. The nest of the yellow warbler is quite common and is readily found in the shrubbery. The Maryland yellow-throat and American redstart both breed in the swamp near St. Louis dam.

The catbird builds every year in the thick parts of the shrubbery and is one of the most adept at hiding its nest. This is a most delightful songster and it is refreshing to hear its bold notes. It has harsh notes as well but these may be forgiven.

A pair of brown thrashers make their headquarters with us each year and usually a nest is found. One time it is in a spruce hedge and another time in a brush pile, and again at the base of a low-growing shrub. This is one of our very best songsters. Early on a May morning it will sit on the top of a tree and fill the air with its strong rich notes. It will then disappear and is rarely seen during the day

A small box was put up by Dr. Fletcher in his back yard with a hole too small for a house sparrow to enter, the object being to induce the house wren to breed in it. He was quite successful, and for three years he has had the pleasure of watching these little fellows building their nest, rearing their young and listening to their shrill but sweet song. We hope that the house wren will become more common at the Farm.

A nest of the long-billed marsh wren was found in the marsh near the canal some years ago by Mr. A. G. Kingston, but this has been the only one taken so far as we are aware.

Of the thrush family the bluebirds and robins are all that are known to breed on the Farm, although Wilson's thrush may breed in the thicker parts of the forest belts or in the natural woods. The bluebird is not common but it seemed a little more numerous the last year or two It usually builds in a hole in the fence posts. The robin is very common and the nests are easily found. Comparatively few broods, however, seem to be reared, as between cats and boys the robin has a hard time of it. Cats may be seen stalking robins I believe at almost any hour of the day or night.

REPORT OF THE ORNITHOLOGICAL BRANCH, 1902.

(Presented and read March 17th, 1903.)

The following report is submitted by the Ornithological Branch.

We regret to state that there are so few systematic observers of birds and their habits that it is difficult to make a very voluminous report of the work which has been actually done during the past year. No species of birds new to the district were discovered, but the number found here is so limited that after more than twenty years' observations it is not to be wondered at that it is only rarely that a new bird is seen.

Notes of the arrivals of birds were again made by some of the members but these were not printed in THE NATURALIST this year. We hope, however, to soon publish a list giving the average dates of arrival of the different birds for the past five years. Thinking it might prove of interest to the Club we have looked up the dates of arrival for the past seven years of those two first harbingers of spring, the robin and the song sparrow.

Robin: 1897, March 22; 1898, March 15; 1899, April 6; 1900, April 2; 1901, March 24; 1902, March 15; 1903, March 9.

Song Sparrow: 1897, March 18; 1898, March 11; 1899, April 6th; 1900, April 1; 1901, March 24; 1902, March 15; 1903, March 13.

The dates of arrival of the prairie horned lark may also be interesting.

Prairie Horned Lark: 1897, February 22; 1898, February 18; 1899, March 15; 1900, February 14: 1901, March 1; 1902, February 27; 1903, February 15.

DESCRIPTION OF A NEW SPECIES OF MATHERIA, FROM THE TRENTON LIMESTONE AT OTTAWA.

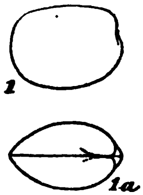
By J. F. WHITEAVES.

The genus *Matheria* was described by E. Billings in 1858, in the third volume of the Canadian Naturalist and Geologist. It was based upon a single species, the *M. tener* of Billings, a small lamellibranchiate or pelecypodous bivalve, from the Trenton limestone at Lake St. John, P.Q. *Matheria* appears to be most nearly related to *Cyrtodonta* and *Vanuxemia*, and is now included in the family Cyrtodontidæ, Ulrich, of the order Prionodesmacea, Dall. The types of *M. tener*, which were collected by Mr. J. Richardson and Dr. R. Bell in 1857, at Blue Point, on Lake St. John, are still in the Museum of the Geological Survey.

A second species of this genus, from the Trenton shales of Minnesota, was described by Mr. Ulrich in 1892, under the name *M. rugosa*, in the Nineteenth Annual Report of the Geological and Natural History Survey of Minnesota. And, in his Report on the Lower Silurian Lamellibranchiata of Minnesota, published in 1897, in volume three, part two, of the Final Report on the Geology of Minnesota, Mr. Ulrich expresses the opinion that the *Modiolopsis recta* of Hall, from the Niagara limestone of Wisconsin and Illinois, is also a *Matheria*.

In the Museum of the Geological Survey there are a few specimens of a fourth and previously undescribed as well as unfigured species of this genus, from the Trenton limestone of Ottawa, collected many years ago by E. Billings and labelled by him with the manuscript name *Matheria brevis*. This species may now be defined and characterized as follows.

MATHERIA BREVIS.



Matheria brevis.—Fig. 1. Side view of the most perfect specimen collected, in outline, and showing the marginal contour of the right valve.

Fig. 1*a*. The same specimen, as seen from above, to show the amount of convexity of the closed valves.

Both of these figures are of the natural size.

Shell small, inflated and regularly convex, but not quite as wide as high, suboval or oblong subquadrate, about one-third longer than high and very inequilateral. Anterior side very short, narrow and consisting of a small rounded lobe below the beaks, on each side; posterior side longer, and a little wider. in the direction of its height; posterior end vertically subtruncate at its mid-height, rounding abruptly into the cardinal margin above and into the ventral margin below. Ventral margin gently convex but curving upward more abruptly and rapidly at the posterior than at the anterior end; superior border almost straight and nearly horizontal; umbones depressed, anterior, very nearly but not quite terminal; beaks incurved.

Surface markings not at all well preserved in either of the specimens collected, but apparently consisting of fine concentric lines of growth. Hinge dentition and muscular impressions unknown.

Approximate dimensions of the specimen figured: maximum length, fifteen millimetres; greatest height, eleven mm.; maximum width, or thickness through the closed valves, nearly nine mm.

Trenton limestone, Ottawa, E. Billings: four nearly perfect but badly preserved specimens.

M. brevis can be distinguished at a glance from *M. tener*, *M. rugosa* and *M. recta*, by its comparatively short, tumid and regularly convex valves.

Ottawa, April 16th, 1903.

REPORT OF THE ZOOLOGICAL BRANCH, 1902.

To the President and Council of the
Ottawa Field-Naturalists' Club.

In submitting the usual report referring to the zoological work of the Club during the past year, it must be admitted that no very new or striking facts are available such as would give special interest or value to this annual record. Many years ago the leaders of the Zoological section pointed out that original observations on our native mammals are becoming more difficult, as the city continues to expand and the surrounding country becomes more thickly occupied, and they specified the moles, the shrews, and the smaller rodents as likely to afford the main field for work open to resident zoologists in Ottawa. This is still largely true, and the shrews, the mice, voles and other small rodents, still invite more systematic study, with the possibility of interesting discoveries. The bats, too, are comparatively neglected, although few of our local naturalists can claim to be familiar with all the species occurring in the capital and its neighbourhood. If during the coming season a small group of enthusiasts would determine to take up such neglected branches of study as these, the zoological section of the Club would have something new and valuable to lay before the members. It is known that the white-footed mouse, the red-backed mouse, and several species of interesting field-mice are found in the Ottawa district, but actual records of specimens obtained are few and far between. A fine specimen of the Black Squirrel, from the Gatineau region, it is understood, was on exhibition on Sparks street in December, and a remarkably handsome Silver Fox from the Coulonge district has been exhibited alive in the city within the last two or three weeks. The amphibians, turtles and snakes of Ottawa require thorough investigation, and observations such as those of Mr. W. S. Odell, two or three years ago, on *Spelerpes bilineatus*, are much required. One member of the Club, Mr. Andrew Halkett, is able to record the examination of a great variety of Teleostean fishes from various localities in Ontario and Quebec. These are being preserved to form the nucleus of a new collection of fishes in connection with the Marine and Fisheries Department.

Professor Macoun handed to Mr. Halkett a specimen of the Brook or White Sucker (*Catastomus commersonii*) obtained by Mr. R. B. Whyte. Fishery Inspector Loveday also furnished a Lamprey (*Petromyzon concolor*) in the larval stage, which had already assumed the parasitic habit and had attached itself to a catfish (*Ameiurusn ebulosus*). Through the assistance of Dr. T. Bell, Algonquin Park specimens of Great Lake Trout, Yellow Perch, Ling, Chub, Speckled Trout, etc., from the Provincial Park were obtained, while fine specimens of large-mouthed Black Bass from Port Perry, Ontario, were sent by Officer J. E. Evans, taken in Lake Scugog. Unusually large examples of the Cisco (*Coregonus artedi*) were received from Lake Erie in November, and Mr Halkett collected at Healy's Falls, Northumberland Co., Ont., Catfishes

(*Ameiurus*), Mullets or Suckers (*Catastomus*), Sun-fishes (*Lepomis*), Yellow Perch (*Perca flavescens*), Ling or Burbot (*Lota maculosa*), also Gar-pike or Bill-fish (*Lepidosteus*) and Killifishes (*Fundulus diaphanus*), in the Bay of Quinte, near Belleville. While in the Province of Nova Scotia, Mr. Halkett secured, at or near Digby, last fall, the Picked Dogfish (*Squalus acanthias*), Codfish (*Gadus callarias*), Tom cod (*Microgadus tomcod*), Haddock (*Melanogrammus æglefinus*), Hake (*Merluccius bilinearis*) Halibut (*Hippoglossus hippoglossus*), Herring (*Clupea harengus*), Smelt (*Osmerus mordax*), Gunnel or Butterfish (*Pholis gunnellus*), also bones of the Angler or Goosefish (*Lophius piscatorius*), and the scapular bones, two vertebræ and three ribs of a Beluga or White Whale (*Delphinapterus leucas*). Finally, a small Sturgeon (*Acipenser*), and the head of a large example, were obtained in the St. Lawrence, near Lancaster, Ont.

In spite of meagre results, suitable for recording in such a report as this, there is every reason to believe that the zoologists are in various ways vigorously pursuing their favourite studies, and, if no important discoveries are made, these studies are a never-ending source of interest and enjoyment.

JOHN MACOUN,
E. E. PRINCE,
W. S. ODELL,
ANDREW HALKETT.

ENTOMOLOGICAL BRANCH.

The third meeting was held at Mr. Halkett's residence on Thursday, Feb. 12th at 8 p.m., and was opened by the host with some observations upon his very attractive collection. His object, when he began collecting, was chiefly to obtain pretty specimens, but he now recognized that such a collection should only be a stepping-stone to one of greater usefulness in which life-histories would be illustrated. After some discussion on these lines, a list was submitted by Mr. Harrington of some forty species of diptera new to the Ottawa List, and he read a short note urging the importance of the study of this order, in view of the influence of many species, such as house-flies and mosquitoes, in propagating diseases, or in otherwise injuriously affecting the welfare of mankind. Mr. Metcalfe described experiments made in Toronto by Dr. Brodie in rearing species of Meloe, and the egg-laying habits of these beetles. Mr. Halkett asked whether any members of the Hydrocampidæ, whose larvæ are aquatic, occur at Ottawa, and in reply Dr. Fletcher stated that two species of these moths were found but not commonly. He also called attention to similar habits of the larva of *Arzama obliquata*, which bores in the stems of the Cat-tail Flag (*Typha*) and can swim from one plant to another; the breathing spiracles being so high up as to be above the surface of the water. Mr. Gibson read some portions of a paper which he is preparing upon the Canadian species of the genus Apantesis (of Arctian moths) with special reference to the larvæ. Two cases were exhibited, containing representatives, generally in good series, of nearly all the recorded Canadian species, showing interesting affinities and variations. Dr. Fletcher exhibited a fine ichneumon fly, *Megaplectes Blakei*, from Cape Breton. This genus of the Cryptidæ is distinguished readily by the swollen triangular second joint of the maxillary palpi. The species in question occurs at Ottawa, and seems to be widely distributed in Canada and the United States. Mr. Young showed some living beetles which he had recently collected under bark, etc., and Mr. Harrington exhibited a series of his Buprestidæ.

The fourth meeting was held at Dr. Fletcher's house on Thursday, Feb. 26th, when a paper was read by Mr. MacLaughlin on the "Classification of the Odonata," or dragonflies. This paper was illustrated by a series of species representative of the different groups and of the principal genera. Mr. Halkett exhibited the nymph-case of a large species collected by him at Spanish River, and which was not recognized by any of the members present. The methods of collecting and preserving dragonflies were discussed and Mr. Harrington mentioned that in Japan, where these insects are very numerous, he had observed the children catching them quite easily by means of a slender bamboo tipped with a little rice-glue. Mr Metcalfe read some observations on the "Day Flight of the Male of *Callosamia Promethea*," which commenced about 4 p.m., while the females were only seen at night. A paper by Mr. Young on the "Inflation of Larvæ" was then read and the author gave an exhibition of the skilful manner in which he prepares his beautiful and lifelike specimens. He inflated a Mamestra larva and also the hairy caterpillar of *Phragmetobia rubicundula*, pointing out that hibernated individuals were somewhat more difficult to make good skins of than the summer forms. He showed fine skins of the caterpillars of *Orgyia leucostigma*, *Ampelophaga myron*, *Phyrria umbra* and *Acronycta impressa*, and also a fine series of imagos of *Colias Eurytheme* (with larva) and a specimen of that rare little yellow butterfly, *Terias Lisa*. Dr. Fletcher showed a White Grub (*Lachnosterna* sp.) bearing the parasitic fungus *Cordiceps melolonthæ*, and Mr. Young stated that similar specimens occurred annually in his garden. Mr. Harrington exhibited a case of some of the chief insects in different orders which he had taken in Japan, and Dr. Fletcher drew attention to several new books on nature study which were upon the table, including Roberts' "Kindred of the Wild" and "Round the Camp Fire" and Long's "Fowls of the Air," etc.

W. H. H.

MEETINGS OF THE BOTANICAL BRANCH.

The first meeting of the Botanical Branch was held on the evening of February 5th, at Dr. Fletcher's house, who, as chairman for the evening, explained that the reason the meeting had been called was twofold. After discussion, the botanical leaders had decided that regular meetings of the Branch would be very useful in keeping up the interest in botany among the members, by giving an opportunity for the reading of notes and short papers and for the discussion of many matters which might not be considered of sufficient importance to bring before the general meetings of the Club; further than this, these contributions would provide valuable matter for publication in the OTTAWA NATURALIST.

Each member present was invited to express his views on the subject. All were unanimous in the opinion that such meetings would be very helpful and Mr. J. M. Macoun, the Editor of the OTTAWA NATURALIST, stated that the contributions would be most acceptable for the monthly magazine ; for, notwithstanding the large number who apparently took an interest in plants and collected them at the excursions, notes of a botanical nature sent in for publication were very few.

Prof. Macoun gave an interesting account of some of the plants he had collected in the Yukon during the summer of 1902. Dr. Fletcher showed specimens of interesting plants he had collected in south-western Alberta, and drew attention to several, the finding of which on this side of the Rocky Mountains was unexpected.

Dr. Ami introduced the matter of dividing the Ottawa district into floral areas for convenience of reference. When these would be definitely decided upon, the distribution of the rarer species could be plotted on the geological map of which the Club has a large supply.

Mr. A. E. Attwood was requested to act as recording-secretary for the meetings and to keep minutes of the discussions.

The second meeting was held at the house of Prof. Macoun, on the 23rd February. The chairman, Prof. Macoun, exhibited a complete collection of the Carices and Antennarias, of Ottawa, and at the same time pointed out the most obvious differences between the various species.

The remainder of the evening was spent in discussing the best method for the systematic prosecution of botanical work in this district.

J. F.

The third meeting was held, March 23rd, at the residence of Mr. J. M. Macoun.

Dr. Fletcher exhibited a plug taken from a drain-tile which had been completely filled with willow rootlets, a branch of the root having effected an entrance at the junction of two tiles. A short discussion on willow hedges followed.

Mr. W. T. Macoun showed a section of a cherry-tree that had been girdled by mice. Above the girdle the diameter was over ½ inch greater than below. The specimen was a natural demonstration of the deposition of woody material formed from food stored during the previous season and elaborated in the following spring. The girdle made it impossible for sap from below to ascend.

Mr. J. M. Macoun showed specimens of *Aquilegia Canadensis* and *A. coccinea* and expressed the opinion that the latter would be found in the Ottawa district. The ripened fruit is the best distinguishing feature of the two species. On *A. Canadensis* the follicles have spreading tips while in *A. coccinea* the follicles are straight and about ⅓ longer. The flowers of *A. coccinea* are much larger than those of *A. Canadensis* and the spur is twice as long. Specimens of *Spiræa latifolia* were also exhibited which showed this species to be quite distinct from *S. salicifolia*; both species are found near Ottawa. The crucial test of a species was, after some discussion, decided to be the continuous reproduction, without variation, of plants from seed.

Prof. Macoun strongly recommended more specialized work on the part of the members and several expressed their willingness to assume responsibility in particular phases of botanical work: Dr. Fletcher, Violets and Carices; Prof. Macoun Fungi; Dr. Guillet, Phenological observations: T. E. Clarke, Ferns of the Ottawa district; W. T. Macoun, Shrubs, with special reference to the genus *Spiræa*; A. E. Attwood, Trees and noxious weeds.

The fourth meeting was held at the residence of A. E. Attwood.

A number of twigs of shrubs and trees were identified and discussed. It was demonstrated that with a little study and care, trees can be determined as readily from twigs and buds as from flowers and fruits.

Dr. Fletcher read an interesting article from "Science" on the effect upon animals of eating "Sleepy Grass." He also spoke of the serious mechanical injury caused to the stomachs of sheep by their eating of the so-called prairie crocus (*Pulsatilla hirsutissima*). This anemone is the first green thing found on the prairies in spring and is freely eaten by sheep. The hairs of the leaves and stem are indigestible and become felted together in the animal's stomach frequently causing death.

The remainder of the evening was spent in listing the localities at which the different species of orchids growing in this region had been found.

The fifth meeting was at the residence of Dr. H. M. Ami. The most important item of business was the settling of the division of the Ottawa district with the view of better describing the localities in which plants are to be found. The *Flora Ottawaensis* is at present receiving considerable systematic attention, with the object of publishing a revised list of the species to be found in the Ottawa district. In order to facilitate the recording of localities, the four geographical divisions of the district are henceforth to be recognized by names.

The Ottawa River naturally separates the Quebec area from the Ontario area. Each is divided into west and east divisions by the Gatineau River and the Rideau River respectively. In the near future these divisions will probably be subdivided into sections, but it was thought wise to go no further at present than the first step, which may be indicated as follows :

The Ottawa District.
A.—The Quebec Area.
1. Quebec West ; 2. Quebec East.
B.—The Ontario Area.
3. Ontario West ; 4. Ontario East.

Dr. Ami announced that he was preparing a map that will indicate the nature of the surface of the land of the Ottawa district.

Several interesting specimens were brought by Dr. Fletcher, among them ;

(1) A tuft of sweet grass (*Hierochloa borealis*) in flower. It came from the Experimental Farm, but is to be found growing wild at the Beaver Meadow and near Lake Flora, Hull. This grass is employed by Indians in making baskets, table mats, etc.

(2.) Vegetable concretions or nodules from Nova Scotia. These were several inches in diameter and almost spherical in shape. They had been formed by the matting or felting together of small pieces of grass, ferns, and pine leaves through the action of water in a pool at the foot of a small waterfall on a rivulet.

(3.) Galls from the roots of rose-bushes. This gall is found on native species and has also attacked a Japanese rose at the Experimental Farm.

(4.) Radishes in various stages of development. Their interest lay in the interpretation of the scale-like appendage adhering to the enlarged stem. It proved to be a remnant of the ruptured sheath of the radicle.

A. E. A.

SUB-EXCURSIONS.

About fifty members and friends of the club met at St. Patrick street bridge on Saturday afternoon April 11th. The leaders present were Professor John Macoun, W. T. Macoun, Andrew Halkett, A. E. Attwood and W. J. Wilson. The party proceeded to Beechwood and McKay Lake collecting plants, animals and rock specimens by the way. The plants found in bloom were *Anemone Hepatica*, *A. acutiloba*, spring beauty, *Claytonia Caroliniana* and blue cohosh (*Caulophyllum thalictroides*). The three first named were found in considerable abundance. Attention was directed to the rock formations as shown on the map of the Ottawa district. In going from St. Patrick street bridge the Utica shale outcrops in numerous places and is seen up to the first road leading into Beechwood. Then by a fault the chazy limestone comes up on the left and a narrow band of Black River limestone on the right. About half way from Beechwood gate to McKay Lake chazy shale appears, and this is the surface rock to the river where it is well seen at Rockliffe. The pleistocene formation round McKay Lake is of much interest. The water in this lake was at one time at least twenty-five feet higher than at present, and was then held in by a deposit of Leda clay through which the small stream which drains it has slowly cut a deep channel to the Ottawa River. All along the eastern shore there are large deposits of shell-marl, composed chiefly of fresh water species, many of which are now living in the lake. Under these deposits are beds of stratified sand and clay which hold marine shells, though we were not fortunate in finding any specimens of these on Saturday. In a sand pit recently opened there is a splendid section of the stratified material. The lower part is very irregular and shows false bedding, while the upper part is in horizontal layers.

At five o'clock the company assembled on a hill overlooking the lake and listened to short talks by some of the leaders on the specimens collected during the afternoon. Professor Macoun spoke on the plants and pointed out many interesting facts about the trees growing close by as to their mode of growth, branching, etc. Mr. Andrew Halkett showed a number of Zoological specimens and explained their structure and habits, and the President, Mr. W. T. Macoun, spoke of the birds seen.

In addition to the plants mentioned above Mr. J. M. Macoun reports that he found the dogs-toothed violet (*Erythronium Americanum*) and *Trillium grandiflorum* in bloom at Kingsmere on the same date.

W. J. W.

The second sub-excursion of the Club for this season was to Blueberry Point, near Aylmer, P.Q., on April 18th, when about fifty members and others attended. The day was fine but cool, although in the woods it was very pleasant. While there was little growth in the woods the trailing arbutus and hepaticas were in full bloom, and large quantities of the former were gathered. There were few other species, however, in flower in the woods at the point. A number of trees of the Banksian pine (*Pinus Banksiana*) which is rather rare near Ottawa, were noticed on the point. The red bellied snake, *Storeria occipitomaculata*, was found to be quite common under the stones in the woods, and one specimen of the grass snake was also procured. Two species of newts were taken. Few birds were seen, and none of special interest. The geologists and entomologists obtained some interesting specimens. Before returning to the city short addresses were given by Dr. James Fletcher, Dr. H. M. Ami, Mr. Andrew Halkett and the Rev. Mr. Bland on the specimens which were obtained and on other natural history topics. It was a pleasure to the president and leaders to find so many young people interested. One boy was noticed kissing a snake, and a young lady was persuaded to stroke one. If no other good came of this excursion than the convincing of the young people, and older ones as well, that these little creatures are perfectly harmless and should be protected and not killed, the Club was well repaid for having this outing.

W. T. M.

The sub-excursion to Rideau Park, better known as "Billings' Bush," April 25th, was the most largely attended of the season. More than one hundred Normal School students and about fifty members of the Club met at Billings' Bridge and guided by the leaders in the several branches of the Club's work entered the woods from the west and spent nearly two hours in collecting and studying plants, insects and birds. The leaders present were: Geology, Mr. W. J. Wilson; Botany, Messrs. J. M. Macoun, A. E. Attwood and S. B. Sinclair, Entomology, Messrs James Fletcher, C. H. Young and A. Gibson; Ornithology, Prof. John Macoun and Miss Harmer; Zoology, Mr. Andrew Halkett. The number of species of plants in flower was not great and the attention of the majority of those present was devoted to the study of trees and shrubs, and the characters by which they may be identified by the twigs and buds. Several interesting insects were collected and identified.

About five o'clock the entire company gathered near the northeast corner of the wood where a convenient pile of logs afforded comfortable seats for the ladies. The president, Mr. W. T. Macoun, was the first speaker, and described briefly the characters by which the various trees could be identified from their twigs. He was followed by Prof. Macoun who in a characteristic speech impressed upon the students the necessity of a basis of definite knowledge upon which to build in studying Natural History. Each fact as acquired would then naturally fit itself into its proper niche, and as the years went on a vast amount of valuable knowledge would be accumulated. Dr. Sinclair's announcement that Nature Study was to be given a more prominent place in the Public School curriculum was received with applause. He pointed out briefly the advantages of such study and said that public school teachers would now be trained so that they would be equipped with all the knowledge necessary to teach children to understand what they saw and heard when in the woods and fields. Dr. Fletcher was the last speaker, and taking for his text a handful of specimens he described their chief characteristics and uses. The great variety of material collected was not apparent until student after student came forward with some specimen different from what anyone else had seen.

The excursion was one of the most successful and enjoyable ever held under the auspices of the Club.

NATURE STUDY—No. I.

By JAMES FLETCHER, Ottawa.

There is probably no subject which has so suddenly taken hold of the minds of educators, particularly during the last five years, as that which is now known in North America under the name of Nature Study.

It has been decided by the Publishing Committee, with the permission of the Editor, that a continuous series of articles upon the common objects of the country should appear this year in THE OTTAWA NATURALIST. It is believed that such articles will be found of value and interest both to our general readers and also to the many teachers and students who read the monthly magazine and attend our excursions. The Ottawa Field-Naturalists' Club is essentially an educational institution, and the officers are always anxious to make use of every opportunity of widening its scope of usefulness.

Much has been done in the schools of Ottawa by prominent members of the Club to foster a love for Nature. Mr. William Scott, now of Toronto, Dr. Sinclair and Mr. Putman, of the Ottawa Normal School, have always appreciated the great value of Nature Study in the science of teaching. Miss Bolton, Mr. D. A. Campbell, Miss Harmon and Miss Lee, Mrs. Ross, Miss Matthews, as well as Mr. Attwood and particularly Dr. Guillet, all of them experienced teachers, have recently made a special feature of stimulating an interest in school work of all kinds by using the attractiveness of natural objects to create a studious habit. Some of our leading newspapers, having recognized the trend of public opinion, have made arrangements for a special department of Nature Study in their columns. A series entitled "In Field and Wood" has already been begun in the *Mail and Empire.*

Nor have the educators in other parts of Canada lagged behind in adopting this important means of arousing interest, enthusiasm, and appplication among the boys and girls who are being trained to be her citizens of the future. In every Province of the Dominion something has been done or some provision has been made in the public schools for imparting to the pupils as part of their regular instruction some knowledge of the common objects which surround them on every side, and this has been found successful to a marked degree in stirring up that interest in all their school studies, which is so essential to advancement.

In education, no progress can be made until an interest is aroused in the subject taught, and nature study, above all things, stimulates mental activity. Its very essence is a spirit of enquiry and a desire for knowledge—to want to know about everything seen, what it is, why it is there, how it got there, and what are its uses. A thirst for knowledge is an instinct, too, which can be cultivated and developed to a wonderful degree. An illustration of the practical value of these studies is to be found in the North-West Territories and Manitoba, where remarkable results are now very apparent in the improved condition of the whole country as a direct outcome of the simple instructions on plant life (illustrated by the commonest plants found in each locality), which have been given in the rural schools during the past five or six years. This has been in connection with the vigorous campaigns which are being annually waged against noxious weeds. Good work has also been done by teaching the boys and girls of the country what is the true nature of hawks and other birds of prey, and how important a part they play as friends and not, as is generally supposed, as enemies of the farmer.

The usefulness of nature study has been recognized not only by the teaching profession, who are making use of it in schools, but also by those important educational institutions, the Exhibition and Fair Associations, which have done much, by offering small prizes, to draw the attention of farmers and their children to the value of a knowledge of the common, beneficial, and injurious plants, insects, birds, and animals of the country.

Let us then consider briefly what Nature Study is. Prof. Bailey, of Cornell University, one of the best known leaders in this work, says that it is "training the eye to see correctly what it looks at, and the mind to draw the right conclusions from what is seen." It is, in fact, a means of bringing about an equal and simultaneous working of each one of our senses—sight, hearing, taste, smell, and touch—with our minds, by which the perceptions are brightened to a wonderful degree and the individual becomes more alert, self-reliant, and useful. Nature study, to be successful and take its most useful place in education must deal with the beginnings of things It imparts an elementary knowledge of all the commonest things about us, which, from their very commonness, are of importance to us, because they touch us so frequently and enter so much into our everyday lives. Nature study is particularly suitable for training the young - even the lowest grades of scholars—whose senses are always keen to observe anything new or strange, and whose minds are always in a receptive state ; but, also, it equally commends itself to the observant and thoughtful student whatever his age may be. It is essentially kindergarten work, and kindergarten work is essentially nature study.

The scope of nature study, as stated, should as much as possible be confined to the simple elements of knowledge. It is simply a means to an end. Its object is not to teach any branch of natural sicence, but to train the mind to acquire knowledge in any direction to which it may be specially directed. It should not be taught by the teacher to the scholar, but studied by the teacher with the scholar—the teacher merely using his superior knowledge and experience in directing and encouraging the scholars to strive to learn for themselves something about all things which come before them. In this way they will become self-dependent, and will not trust blindly to what is told them or what they find in books, but they will examine, consider, and confirm everything for themselves.

Wrong ideas about many things in nature are very widespread, and there is an inexplicable lack of knowledge on the part of a large proportion of the community with regard to many things concerning which some easily obtainable information would be of great benefit to them. All the foolish things, and nearly all the wicked things done in the world, are due to people not knowing many simple things which they ought to know. There is, perhaps, no such widespread and unnecessary cause of unhappiness or actual misery as the fear of being in the dark, which is felt by so many children, and even by many grown-up people, and, yet, if one will only think the matter out carefully, he will have to acknowledge that it is an almost unheard-of thing in Canada for any injury to happen to anyone in the dark which is not liable to occur in daylight. If children were made to understand this by giving them definite information concerning the imagined sources of danger, how many pangs of anguish would be spared !

Inaccurate statements about animals, birds, insects and reptiles are the cause of much unfounded fear, which not only produces unhappiness, but prevents the doing of important duties or the performance of many kind acts. How much happier many would be, were they convinced of the fact that such a thing as a true record of an actual instance of a wolf attacking a human being in North America is unknown, notwithstanding the statements to the contrary, which frequently appear in the press and in books on natural history ! Just as inaccurate are the accounts of supposed injuries by spiders, which are generally but falsely accused of biting children. Many other inoffensive insects, such as caterpillars, dragonflies and beetles are dreaded, and too frequently ignorantly destroyed as deadly enemies of the human race, which have no possible power to do us any harm.

Again, reptiles of all kinds are as a rule very much dreaded, but, except in the few localities where rattlesnakes occur, we have no venomous reptiles in Canada. In fact, it may be truly said that, if we leave out of consideration mosquitoes and a few other flies, there is practically no wild reptile, beast, bird or insect in our woods which will or even can do us any harm.

Nature study will do away with a vast amount of this lack of knowledge, and to a large degree will increase the happiness and contentment of those who are drawn to nature for solace, recreation and rest, and are thus enticed into the leafy woods and dewy fields to study the many beautiful, fascinating and instructive objects there to be found.

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THE BEETLES OF AN OREGON BEACH.

By H. F. WICKHAM, Iowa City, Iowa, U.S.

If one looks through the annals of Entomology, he will find the sea coast of Oregon rarely mentioned. If now he will turn to a map, he will see the reason, for the railroads seem to have avoided the district to a remarkable extent, so that it is not to be reached with the same ease as corresponding regions in the other Pacific States. In fact, there are only two ports on the entire Oregon coast that are connected with the great north and south trunk line—namely Astoria, at the south of the Columbia, which has rail connections with Portland, and Yaquina, on a bay of the same name, about 100 miles farther south, reached from Corvallis or Albany by a line through the intervening mountains.

While Yaquina Bay is not of much importance to the world at large, it has nevertheless quite an extended reputation in Oregon, on account of the fine beach at Newport, a small village which owes its prosperity to attractions as a summer resort. The ride from Albany takes several hours, though the distance to be travelled is but about a hundred miles. However, the trip is a pleasant one, the hill scenery being pretty, if not exactly grand. Unfortunately, much of the original coniferous forest has been burnt off along the line, though there is enough left to show that the growth must have been a heavy one. Live oaks are a prominent feature of the flora, and in places form considerable groves.

At the head of the bay lies Toledo, too far from the beach to answer as headquarters for one intending to collect, for the shores in the immediate vicinity are extremely muddy and uninviting.

The bluffs approach them closely, and the intervening flats are largely salt marsh. A few miles farther down is Yaquina, once a thriving seaport. but now a very poor community. This is the terminus of the railroad, and, as it is not far from the open coast and furnishes fair accommodations, I made it my stopping place. The village lies mostly on a narrow mud flat, nearly all of the houses being built on piles, so that during high tide the occupants can look out of their windows into the water, while at low tide they have a vista of mud spread before their eyes.

In the immediate vicinity of Yaquina are ranges of hills, covered with a growth of coniferous and other timber, badly damaged from fires. Of the fauna of this district it is not my intention to write, since it partakes of the ordinary nature of such locations on the north coast. The beach proper is near Newport, which lies at the south of the bay, and can be reached from Yaquina by a steamboat, making daily trips, or by a walk of a few miles along the shore when the tide permits. My general plan was to go over on the steamer and walk back, as this gave me a longer day than I could get in any other way. The beaches are several miles in length and are backed by great bluffs which come within a few rods of the water's edge, their faces precipitous for the most part, except where the drifting sand has modified the contour. The highlands back from the bluffs are extremely sandy and covered with a growth of dense scrub, with open patches here and there. In the distance are groves of conifers.

A number of small springs ooze from the face of the bluffs and trickle for some distance over the sands at the base. Many species of beetles favor just such spots, which offer, in consequence, a fine field for the collector. *Cicindela oregona* runs and flies about these damp sands, in company with one of the forms of *Bembidium littorale*. By overturning small pieces of wood and other rubbish, I took quite a series of *Omophron ovale*, *Bembidium transversale* and *Nebria diversa*, the last named being a rather uncommon species in collections and differing by its curious pale color from most of our other *Nebriæ*. Where the water had spread out a good deal, I found a rather large *Dyschirius* in some abundance, either running about in the sunshine or burrowing under the sand among the runways of *Bledius ornatus*. I saw on one occasion a *Bembidium littorale* carrying off a *Dyschirius* and a *Bledius*, but did not succeed in finding out whether the Carabidæ had hold of the Staphylinid or whether the *Bledius* had been seized by the *Dyschirius* which in its turn had been attacked by the *Bembidium*. I think the former alternative the more likely, as the soft tissues of *Bledius* render it especially liable to the attacks of stronger beetles, and in some spots, where it occurred in thousands, the *Dyschirius* might be seen preying on it extensively.

Where the beach was simply moist rather than wet, one might get nice series of *Phycocœtes testaceus* under logs, in company with *Elassoptes marinus*. Both of these weevils are commonly found in colonies where they occur at all, the former, however, being perhaps more partial to the shelter of bunches of cast-up seaweed. These masses of algæ also served as refuge for numbers of *Cercyon fimbriatum*, *Cafius canescens* and *Saprinus bigemmeus*. Back in the dry sand dunes, one might sit and scoop out the side of a hillock, and, as the grains sifted down, out would fall the Tenebrionidæ that frequent them—the common forms being *Cœlus ciliatus*, *Phalergia globosa* and a species of *Eleodes*. *Sinodendron rugosum* and *Ceruchus striatus* were dug from beneath half-buried logs.

When the wind is in the right quarter, the collector may always find some good things cast up by the waves ; but, as these are usually species of at least fairly strong flight, I was surprised to find drowned specimens of *Omus dejeanii* and *O. audouinii* at the water's edge. A number of *Buprestis langii* were thrown ashore, but one had to get them quickly if it were intended to make use of them for the cabinet, as the bodies were immediately attacked by small crustaceans and soon reduced to mere shells. *Leptura tibialis* and *L. matthewsii* were occasionally noticed flying over the beaches, but I could not ascertain whence they came. *Cicindela bellissima* was quite abundant, chiefly on the very fine dry drifted sand close to the base of the bluffs, and, being only moderately shy, was readily captured by working up from leeward. I find a pair of *Copidita quadrimaculata* among my collections from this vicinity, but there seems to be no record in my notes as to the circumstance of capture. However, I have found the same insect in great numbers at San Francisco, under pieces of wood, paper, cloth or other rubbish, just far enough from the beach to keep dry

The ocean face of the bluffs was quite steep in most places, but where it could be readily ascended I made a search for beetles, without finding a large number of species. The best insect I managed to get, was a small one—*Adranes taylori*, a blind Pselaphid, of which I took a few in the galleries of a small ant. Fortunately, I happened on the breeding season, for the beetles were paired, walking unconcernedly among their hosts, who did not molest them in any way. This genus has only recently been found on Vancouver Island by Rev. Geo. W. Taylor, after whom the species has been named.

Looking at the collections with reference to those made at other places, one can readily see that they are in general much the same as might be formed at any point on the coast from San Francisco northward, though a number of the beetles extend their range south to the extreme limit of the United States. Still there are some that would be noteworthy captures anywhere, and it is always worth while to record the habitats of such forms, when they can be ascertained. As far as present knowledge goes, *Cicindela bellissima* is not found at any other point, and the attention of collectors who have the opportunity of visiting the country on either side of Yaquina Bay, should be turned to the task of determining the real range of this species.

MAP OF THE OTTAWA DISTRICT.

We are pleased to announce that at a recent meeting of the Council it was decided to reduce the price of the Map of Ottawa to the members of the Club. This valuable map, which will be of the greatest service to working naturalists for plotting the occurrence and distribution of species in all branches of natural history, may now be obtained from the Treasurer at the low price of 5 cents a copy for members of the Club, which is almost at cost price, and by those who are not members of the Club at 10 cents a copy.

A RED-SHOULDERED HAWK IN CAPTIVITY.

ROGER T. HEDLEY, Duncrief, Ont.

(Read before the Ornithological Branch of the Entomological Society of Canada.)

One day in October, 1901, I went out for some sport with my gun. I had not gone far when I noticed a hawk sitting on a dead branch of an elm tree. It was a good distance, but I thought I would try a shot. The first barrel only startled it; but, before it had gone far, the second shot dropped it. My dog ran to the hawk, which threw itself on its back and showed fight. I threw my coat over it, slipped a strong cord around its neck and carried it to the barn, where I placed it in a large box with a slat front. The only wound was on the left wing, and the bone had not been broken.

I placed a perch in the box for the hawk to sit on and soon it jumped up. The first thing I got for it to eat, was an English sparrow. When I threw the bird into the box, the hawk seemed frightened and did not offer to touch it till I stepped away from the box. Then it jumped down from the perch, and, having seized the sparrow with its talons and spread its wings, it marched around carrying the bird in its claws. Before commencing to eat the sparrow, it picked out the wing feathers and most of the small feathers of the body. After each mouthful of feathers, it would glance sharply around to see if anything was going to interfere. It first ate the head and then proceeded to devour the remainder. I fed it mostly on sparrows during the winter, but occasionally found a mouse, which it seemed to relish better than sparrows. My hawk soon became so tame that it would start to eat its food without waiting for one to retire. After seizing a mouse in its claws, it would pick it up with its bill, then catch it again with its claws before eating it. It always ate the head of a mouse first, and usually swallowed or tried to swallow the hind quarters along with the tail. Sometimes I have seen it stick at this last operation, when it had to pull its mouthful out again with its claws. Then it took a few bites before the tail disappeared.

After the snow went away last spring, it was an easy matter to turn over old logs or stumps near the woods and get mice for the hawk. I have sometimes given it more mice at one time than it could eat in a day. One day it ate ten, but the next day it did not seem very anxious for food. When I hold a mouse near the box, it makes quite a fuss, and, if I throw the mouse at the hawk, it springs from its perch and never fails to catch the mouse in the air with its talons before it touches the floor.

When I captured the hawk, it was evidently in the first year's plumage. Its general colour above was dark brown ; below, its feathers were whitish, with longitudinal brown-pencilled markings. The tail was barred with whitish. It moulted this summer, and its new feathers came in of a different colour. Above, it is a reddish-brown, with the centre of the feathers darker than the outside. The bend of the wing has assumed an orange-brown tinge, and the barring of the tail is brighter coloured. The breast and lower parts are light reddish-brown with whitish barring.

At night, when it is sleeping, it takes a queer position. It curls its neck around and hides its head in the long feathers of its neck. One has to look closely at it to see the least sign of a head. Its appetite varies much with the seasons. In winter a fast of three or four days is not always sufficient even to provoke even a fairly good appetite, and a week's fast does not make it so hungry as a fast of two days in summer time.

I have often watched it in the act of ejecting a pellet of fur, feathers and bones, which is the habit of the Raptores in general. After undergoing several of those contortions of the back which afflict a human being in the act of vomiting, it shakes its head violently, and the pellet, on leaving its mouth, is often thrown many feet to one side. The pellets vary in size from 1 to 1½ inches in length and are usually about twice as long as they are thick. The ends of the pellets are generally somewhat rounded, but sometimes they have quite a sharp point. Those I have examined particularly, consist of a number of wads of about ¼ inch in thickness, and, when the hawk has been fed solely on mice, they have usually contained nothing but fur and a few small bones, sometimes so small that they are hard to find.

CURIOSITY OF A HUMMINGBIRD.

Last summer, as I was sitting in the woods behind a summer-house, making the hissing sound which Mr. Chapman recommends to attract birds, a hummingbird came to me and hovered over and flew about my head, now and then alighting a few moments, not upon me, but on some twig near by, surveying me curiously the while. Then off it darted till lost to view. But pretty soon, as I kept on making the sounds, always sitting quite still, back it came again, acting as before. The bird came and went away in this manner four times. It constantly uttered a sound very similar to the noise I was making with my lips. All this took place in a few minutes.

There were two things new to me in the behaviour of this beautiful creature : its chirping and its intelligent curiosity. I find the chirping mentioned in Mr. Saunders's interesting article on Canadian Hummingbirds in THE NATURALIST of last July. The curiosity, or rather the essentially bird-like curiosity, shown by this hummingbird, was very surprising to me, as I had been led to believe, by reading Mr. Hudson's account of the nature and habits of hummingbirds, that none but the crudest insect-like curiosity need be looked for in any hummingbird. That most charming of natural history writers, in "The Naturalist in La Plata," after noticing that hummingbirds have frequently been stated to be more like insects than birds in disposition, affirms that they are not to be compared even with the more intelligent insects, but have a much closer resemblance to the solitary wood-boring bees and to dragonflies. To support his opinion, he makes, among others, the following statements some of which are of interest in connection with Mr. Saunders's observations : "Their aimless attacks on other species approaching or passing near them, even on large birds like hawks and pigeons, is a habit they have in common with many solitary wood-boring bees. They also, like dragonflies and other insects, attack each other when they come together while feeding ; and in this case their action strangely resembles that of a couple of butterflies, as they revolve about each other and rise vertically to a great height in the air. Again, like insects, they are undisturbed at the presence of man while feeding, or even when engaged in building and incubation; and, like various solitary bees, wasps, etc., they frequently come close to a person walking or standing, to hover suspended in the air within a few inches of his face; and, if then struck at, they often, insect-like, return to circle round his head. All other birds, even those which display the least versatility, and in districts where man is seldom seen, show as much caution as curiosity in his presence; they recognize in the upright unfamiliar form a living being and a possible enemy."

So far as concerns the curiosity of the Ruby-throated Hummingbird, I am compelled, in the light of the incident mentioned above, to differ from Mr. Hudson. It seems to me that my hummingbird acted in the very way described in the last sentence quoted from him. Its actions are certainly much more comparable to those of the squirrel and the chickadee in like circumstances than to those of any insect. Who ever heard of a dragonfly or bee showing an interest in sounds, recognizing them as similar to its own and returning again and again from afar to investigate their curious source in the manner above detailed?

CEPHAS GUILLET.

March, 1903.

ENTOMOLOGY.

HAGENIUS BREVISTYLUS, Selys.

Referring to a note in THE OTTAWA NATURALIST for May last at page 37, in which it is stated that the nymph case of a large dragonfly was exhibited by me at one of the Entomological Branch meetings, and that the species was not recognizable by any of the members present, I may say that Dr. Fletcher has communicated with Professor J. G. Needham about this pupa case and also sent to him a drawing of the specimen, which has been identified as belonging to *Hagenius brevistylus*, Selys, the nymph of which is well figured in Professor Needham's valuable work on the "Aquatic Insects in the Adirondacks." (N. Y. State Museum, Bull. 47, 1901.)

A. HALKETT.

MOOSE WITH ELK ANTLERS.

(With one plate.)

By the Rev. Wm. A. Burman, Winnipeg.

The photograph accompanying these notes shows two moose heads. The normal moose antlers are to illustrate the very curious variation in the other pair, which are almost typical elk antlers.

The moose thus curiously distinguished was killed some weeks ago in the country north of Beausejour, Man., and about 60 miles north-east from Winnipeg. The head is now in the possession of Mr. Alexander Calder, taxidermist, Main street, Winnipeg, to whose courtesy I am indebted for the photograph and notes. The measurements are as follows :—

Length of head from mouth to crown	30 in.
Round the head at base of antlers	39 in.
Round the nose	24 in.
Spread of antler prongs . .	50 in.
Length of longest prongs from base	40 in.
Circumference of antler at base .	6½ in.

It would be interesting to know if such freaks as this are common. If not, then what is their significance? I have heard of a case in the far north where a moose had one antler as in this case, the other of normal shape. Does the health of an animal influence these growths? Or would environment affect them? Is it not possible that some significance, not yet discovered, lies hidden in the so-called "freaks" of nature such as this? Personally, I should be glad to know what others can tell about similar cases to the one here figured.

A Rat as an Entomologist.—On going to a street electric light on the evening of May 25th to collect insects, I was surprised to see a common rat busily engaged in the grass below catching and eating June Beetles (*Lachnosterna*).

J. Fletcher.

BOTANY.

MEETINGS OF THE BOTANICAL BRANCH.

The sixth meeting was held at the residence of Mr. D. A. Campbell, on the evening of May 15th. He exhibited a large number of mounted specimens of plants with the object of illustrating how leaves seem to vary according to their environment. He held that where light is intercepted by water or by the crowding of plants, there is a tendency for leaves to subdivide. Prof. Macoun was inclined to hold that leaf-division indicated relationship rather than the effect of environment. In support of this, he mentioned the fact that the first leaves of the Horse Radish are much dissected, even in the driest soil. In the course of the discussion, this principle was enunciated : Generalize *from* not *to* facts.

As an aid to those who wish to become acquainted with the different species of violets, the information was given by Dr. Fletcher that at the Experimental Farm he had now growing all the recognized species of this locality, as well as some which had not been described. In addition, fine clumps could be seen of several other species from different parts of Canada and the United States. In all he had about 30 named species, many of these at the present time in full flower.

As far as known, all our wild plums are *Prunus nigra* and not *P. Americana* as was once supposed. The points of difference between the two species may be indicated in tabular form.

	Prunus nigra.	*Prunus Americana.*
1	Sepals serrate or serrulate.	Sepals entire.
2.	Petals white, becoming pink.	Petals white, not becoming pink.
3	Leaves crenulate-serrate.	Leaves sharply toothed.
4.	Fruit with no bloom.	Fruit with a white bloom.

Prof. Macoun mentioned that he had found the Shell-bark Hickory at Pointe du Chene, the locality recorded in the "Flora Ottawaensis" many years ago. Dr. Fletcher stated that it grew not only there but also in greater abundance at Casselman, Ont., 30 miles from Ottawa.

Dr. Fletcher, who had just returned from a trip to Hamilton, showed some remarkable sports of *Trillium grandiflorum* which, in company with Mr. J. M. Dickson, he had collected in that district. The inner circle of the perianth was beautifully striped with green, and in some of the specimens almost as deeply green as was the outer circle. The foliage leaves were distinctly petioled, in some cases the stem being fully 3 inches in length. It was suggested that the variations might be due to some fungous disease. Dr. Fletcher mentioned several plants of which the whole habit changed when they were attacked by fungous diseases, for instance, some Euphorbias, Portulacca, Amarantus, Capsella, etc.; but did not think this sport was of the same nature. He had several plants of the Trilliums which had been under cultivation for 5 or 6 years, one of which had been figured in THE OTTAWA NATURALIST. The greening of the petals varied in extent year by year but had so far persisted, although showing a tendency to disappear. The lengthening of the petioles seemed to correspond to some extent with the amount of green on the perianth. This form occurs in several localities in western Ontario, but is abundant only in certain woods.

The remainder of the evening was spent in discussing the question: "What is Nature Study?" The general conclusion seemed to be about the same as that of C. B. Scott, who, in his "Nature Study and the Child," devotes an entire chapter in answer to the question. It is, he says, "*Nature, studied, in its relations, by the child, from the child's standpoint, by the teacher, with the children.*"

A. E. A.

VIOLA LANCEOLATA, L.

An interesting addition to the Ottawa flora has been reported by Miss Katherine Lee in the shape of the pretty little white-flowered Lance-leaved Violet (*V. lanceolata*), which was collected in flower May 25th by Miss Fanny Wright, close to the water on the sandy shore of the island in Fitzroy Harbour, Ont., near the Chats Falls on the Ottawa. This is the first time this plant has been found in the Ottawa district. It should be recorded on the floral distribution maps of the Ottawa district as in the Ontario Area West.

A FURTHER NOTE ON THE BLUE-TAILED LIZARD.

The interesting record, in the March number of THE NATURALIST, of the occurrence of the Blue-tailed Lizard, or Skink, at Stony Lake, reminded me that there were some other records of this little reptile's occurrence in Ontario.

For the seven or eight years from about 1885 to 1892, the Natural History Society of Toronto made an annual collection of reptiles to exhibit at the Toronto Fair, and on several occasions, during that time, we obtained Canadian specimens of the Blue-tail. They were usually rather difficult to feed and keep alive for any length of time ; but one adult, that I had, took flies and earthworms readily, and became tolerably tame. It buried itself for the winter under earth and leaves that were put into its case, and came out again all right in the spring.

I have inquired of Mr. Brodie, who was president of the Society, and of Mr. Hollingworth, who was secretary for a number of the years mentioned, if they remembered where our specimens came from. Mr. Brodie says that the species is found on the Georgian Bay, a little north-east of Midland, also along the north shore of Lake Erie from Long Point to Rondeau ; and Mr. Hollingworth remembers receiving one specimen from Muskoka.

It seems to be the only true lizard found in Ontario, and occurs, apparently, in a few isolated spots, though a careful search would, perhaps, reveal its presence in some other localities

J. B. WILLIAMS.

Toronto, May 5, 1903.

EXCURSION TO CALUMET, QUE.

Montreal Natural History Society.—The annual excursion of this thriving society is to be held on June 13th to Calumet. Our Club has been asked to join them The Council hopes that as many as possible of our members will avail themselves of this opportunity to meet our Montreal friends.

NATURE STUDY—No. II.

THE NEED OF NATURE STUDY.

By D. A. CAMPBELL, B.A., Ottawa.

The infancy of every nation has been passed in open communion with nature, and has been developed under the expanding power of objective influences, the open landscapes, the tranquillity and solitude of forests, the massive grandeur and sublimity of mountains, the peace and beauty of valleys, the light-heartedness of laughing brooks, and the lofty and grave ministrations of sky and heavenly bodies.

The foundation of all education is a training of the senses, but in this artificial and introspective age we are losing sight of this objective influence of nature, ignoring the plan by which the human mind has been nourished and developed for untold generations.

Children in cities are being cut off more and more from the material most necessary for the free and healthful development of their powers. The mind is weaker, the intelligence is less active, when the child is in this way deprived of the food so necessary for mental growth. There is much more in those fresh air excursions sometimes provided for young people than a better atmosphere for a short time. The mind is being thronged at the same time with sensory stimuli, which cause brain function, and consequently mental power.

The best material for sensory training is that afforded by nature, and the time for it is especially the formative or growing period of the individual.

In our Public Schools no daily systematic training is given to the sensory side of the pupil's life. It may be claimed that some sensory training is given, recognition of words, places on maps, &c., but this, it must be admitted, is artificial and not natural material for the pupil to work upon. It lacks the multitudinous variety so apparent in Nature Study. There should be a portion of every school day set apart in our Public School course for a systematic training of the senses.

In the High Schools and Collegiates some provision is made for such work, but the time devoted to the subjects is limited, and optional, whereas it should be compulsory for every pupil. The pupil at no stage of his school career should be left to chance for his sensory training, and this is especially true for those who live in cities. It is easy to persuade the pupil to do much for himself, to throw himself into contact with nature, to ramble through the woods, over hills, and along river banks, to leave the printed page and the burden of memory studies, and view the living face of nature in her wealth of objects, of phenomena and of landscape. The proper way to study nature is at first hand, and the proper way to train the senses is to use them on the abundance of material supplied by nature.

Besides the sensory training afforded by nature study there is a constant challenge given to the best powers of the mind, and there are supplied problems sufficiently difficult and abstruse to satisfy the most exacting.

It is a mistake to suppose that, for instance, the whole study of Botany is made up of technical terms and the collection of plants, giving them an unpronounceable name. Would Peter Bell, of whom Wordsworth tells us :

> " A primrose by the river's brim
> A yellow primrose was to him,
> And it was nothing more,"

be roused from his apathy, by the information that "the primrose is a dicotyledonous exogen, with a monopetalous corolla and a central placentation," and by the statements of many other facts in similar technical language? Would his indifference not rather be tenfold increased?

Although technical terms are as necessary in Botany as they are in any science or trade to the workers therein, yet botany must certainly not be looked upon as a "modernized repository of classical roots and derivations."

The real object of the study should not be lost sight of. A profitable study of Botany would lead one to investigate the structure of the plant, the infinite variety in leaf and flower, the intelligent and useful arrangement of the parts of the root, stem, leaf and flower, the assistance of a neighbor and the dependence of a flower upon the insect, its allurements such as nectar and pollen heralded by color and perfume for the purpose of attraction, the debt of gratitude it owes its insect friend, its struggle to maintain itself and thereby its kind, the adaptability of its leaf to its probable share of sunshine and air, and the marvellous ingenuity in its method of dispersing its seed, its care and provision for its young, its habits as regards soil, moisture, light, climate, and time to bloom.

These are some of the questions which afford material for the use of the senses and for the exercise at the same time of the best powers of the mind, and promote as much mental development as those subjects which are now considered the most valuable in our programme of studies.

Let me illustrate by our common flower—the Dandelion, which, though trodden under foot daily, is teeming with interesting problems for the student.

While in its bloom, it lies low in the grass and is careful never to push its head above the average level of its garrison of grass. If the grass is long, however, its flower is raised up also. It would be interesting to know how it succeeds in accommodating itself so well to its surroundings. It is easier to see the advantage it is to the little flower, not to be so low down in the grass as to be completely smothered, nor so high above it as to be exposed to the whim of every passer by who, like Domsie, might cut off its head with his cane on some occasion when his joy overcame him. When its seeds are ripened, it pushes its head away above its surroundings and invites the violence which will disperse its seeds.

The Dandelion flower expands in sunlight; closes up in gloom. The advantage of such an arrangement must be manifest to all; but it requires the most careful study to ascertain the way in which it opens and closes apparently at will.

The attractive coloring must suggest some points of interest. Is the yellow color associated with a flower of a low or high organization? What scale of colors is adopted by nature in the decoration of her handiwork? A study of the flower will convince any one that color has an important relation to the plant. It is visited by insects and some observation will disclose the fact that color is for the express purpose of attracting insects.

The question suggests itself—What advantage comes to the flower in being visited by an insect? What compensation is made to the insect for its valuable service to the flower? What happens to any particular flower which entertains no insect guest?

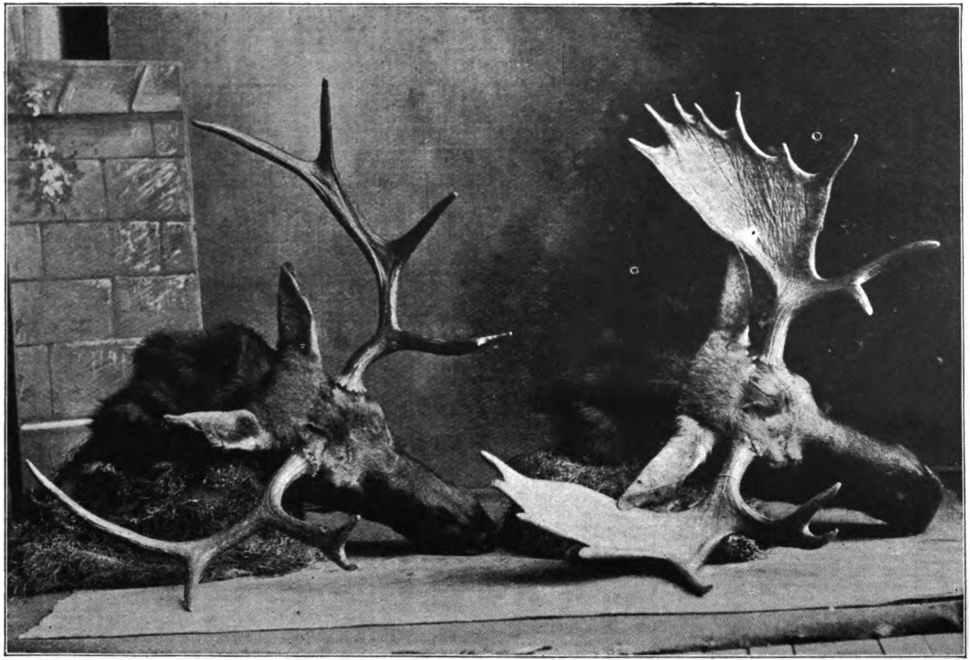
The dependence of flower upon insect and the co-relation of the individual and its environment will surely teach a lesson as applicable to human welfare as to vegetable.

This little plant has settled the question of aerial navigation for itself long before such questions agitated the Santos Dumonts of the modern world. Its tiny seed is fitted out with sails which bear it upon the winds of summer, upon a voyage of exploration and colonization. It settles down, making use of an anchor whose simplicity is only equalled by its adaptibility to its purpose.

The question of economy of material has likewise been carried to perfection, quite up to modern ideas upon the subject. It has been found that in ocean vessels carrying large masts, less iron may be used if the masts are hollow. Greater strength is given for the same amount of material. This common every-day flower long ago raised its head of florets upon a stem built upon the most recently improved pattern.

What place does the Dandelion occupy among flowering plants? A comparative study will show that its flower cluster is a highly organized one. It stands almost at the head of flower clusters and would seem to be one of Nature's latest productions. This may be learned by observation and comparison of flower clusters. The simplest clusters are such as those of the Pyrola and the Shepherd's-purse. In these the flowers have stalks all of nearly the same length, and the earliest flowers to bloom are the lowest. If these stalks were lengthened so as to bring all the flowers to the same level, we would have the flat-topped .cluster, such as that of the Hawthorn. In such a cluster the earliest flowers to bloom are the outermost. If in such a cluster we were further to shorten the common stem upon which the individual flowers are arranged, broadening the top so as to make room for them, and, at the same time, if we were to eliminate the little stalks of each flower so as to have it rest immediately on the top of the broadened stem, we would have a cluster like that of the dandelion. This is the most perfect kind of cluster. Considering this, therefore, and remembering also the very great departure of each floret from the structure of such a simple flower as the Buttercup, for instance, we are compelled to believe that the Dandelion occupies, not the most exalted, perhaps, but a very high place in the commonwealth of flowers.

These are some of the problems which challenge the attention of the student. Here he finds abundance of material for sensory training, and at the same time is confronted by questions the solution of which will require his best thought and reflection.



Head of Moose with Elk Antlers, and another with normal Antlers.

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THE OTTAWA NATURALIST.

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DESCRIPTION OF A SPECIES OF *CARDIOCERAS* FROM THE CROWS NEST COAL FIELDS.

By J. F. WHITEAVES.

The genus *Cardioceras* of Neumayr and Uhlig consists of a few species of Ammonites with compressed involute whorls, a crenulated keel, and acute radiating ribs,—that were formerly referred to the Amalthei of Von Buch, and that have hitherto been regarded as peculiar to the Callovien and Oxfordien subdivisions of the European Upper Jurassic. It was first described in the twenty-seventh volume of the "Palæontographica," published at Cassel in 1881.

In the second volume of the "Handbuch der Palæontologie" (1881-85), Zittel regards *Cardioceras* as closely related to the Liassic genus *Amaltheus*, but Hyatt, in his latest and much more recent classification of the Ammonites in Eastman's translation of Zittel's Text-book of Palæontology (1900), places these two genera in different families, and says that "the young are very distinct."

One of the commonest and best known species of *Cardioceras* is the fossil originally described by James Sowerby in 1813 (Mineral Conchology, vol. I.) as *Ammonites cordatus*, which is abundant in the Oxfordien of England, France, Switzerland, and Russia. Of this species there are several good specimens in the Museum of the Geological Survey, that were collected by the writer in 1859 or 1860, from the Oxford Clay and Coral Rag near Oxford, England.

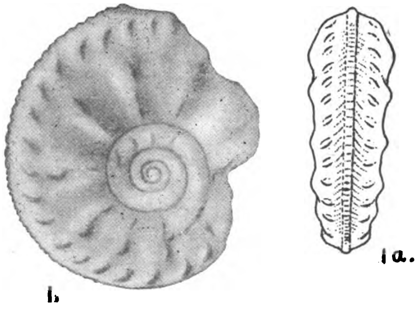
The genus has not previously been recognized in rocks of any age on the North American continent, but the *Ammonites cordi-*

formis of Meek and Hayden, from the Jurassic rocks of the Black Hills of Dakota, that was first described in 1858, is evidently a typical *Cardioceras*.

Three years ago, in June, 1900, Mr. James McEvoy who was then on the staff of the Geological Survey, discovered a small specimen of an Ammonite, that appears to be a true *Cardioceras*, from a coarse grit near the top of a ridge running N. 20° E. and situated two miles and a quarter N. 70° E. from Fernie, B.C., about 4,000 feet above the sea level. The specimen is only a natural hollow mould of the exterior of a shell that is imperfect at the aperture and about thirty-two millimetres, or an inch and a quarter, in its maximum diameter. But, this mould is so sharply defined that good white gutta percha impressions of it, or "squeezes" from it, show both the shape and surface markings of the whole of one side of the fossil and of part of the other, remarkably well.

These impressions indicate the immature stage of a species of *Cardioceras* that seems to be very closely related to the European *C. cordatum*, but that may be provisionally named and described as follows.

CARDIOCERAS CANADENSE, nom. prov.



Cardioceras Canadense.

Fig. 1. Side view of a gutta percha impression from the natural mould collected by Mr. McEvoy.

Fig. 1*a*. Peripheral view of the same, slightly restored on one side.
Fig. 1 slightly enlarged, Fig. 1*a* of the natural size.

Shell, at least in its immature stage, compressed, shallowly and rather widely umbilicated, with a small and minutely crenulated keel. Whorls about five, increasing rather rapidly in size and rather strongly embracing, about one-half of the sides of the inner ones being covered by the overlap of those that succeed them. Umbilicus occupying about one-third of the entire diameter, on each side, though its margin is rounded and very indistinctly defined ; peripheral carina neither very prominent nor distinctly compressed.

Surface of each side of the outer volution marked with a few comparatively large and distant but narrow and acute primary radiating ribs, that commence at the suture and terminate about half way across, in a small pointed tubercle. Of these ribs there are about ten in the specimen figured. Besides them there are rather more than twice as many small short secondary ribs, that are little more than narrow, transversely elongated, compressed and acute tubercles, on the outer half of each side. The primary ribs almost bifurcate from a median tubercle, and seem to occasionally alternate with an intercalated secondary rib, but the secondary ribs are not quite continuous with any of the primaries. Between the secondary ribs, also, and parallel to them, there are a few fine radiating raised lines.

Sutural line unknown, as are also the exact shape and sculpture of the adult, and the contour of the outer lip.

Judging by Meek and Hayden's figures, specimens of *C. cordiforme* of about the same size as the fossil collected by Mr. McEvoy, have much smaller and more numerous radiating ribs, that are devoid of tubercles.

The discovery of a species of *Cardioceras* in the Crows Nest Coal fields is of considerable interest, as tending to show that the grits in which it was found are probably of Jurassic age. Associated with *Cardioceras* in these grits, there are fragments of guards of a rather slender belemnite.

Ottawa, June 6, 1903.

NESTING OF SOME CANADIAN WARBLERS.

THIRD PAPER.

By WM. L. KELLS, Listowel, Ont.

BLACK-THROATED GREEN WARBLER (*Dendroica virens*).

This species is more often observed in the periods of the spring and fall migrations than during the intervening season, except in certain favorite localities. The majority of these migrants that pass through south-central Ontario in the spring season, appear to go further north for the nesting season; though it may be that many more pairs remain and nest in the swamp woodlands of south Ontario than the few who in this country have yet made the life-history of our minor woodland birds a subject of special study are aware of. Occasionally, specimens of this species are noted in certain lowland woods in the vicinity of Listowel, in the breeding season; and every year—in early summer—I note the song of the male bird at a period when the female is doubtless incubating. I feel certain that some of the species nested on *Wildwood* in past years, for on one occasion I examined a specimen of this species in its nesting plumage, that was shot in the back wood on the premises, in the month of August; and, earlier the same season, a pair had been noted frequenting a clump of conifers in the vicinity; but the clearing up of the original forest and the draining of the low grounds have, with the improvement of the country, effected many changes in the summer haunts and nesting homes of various species of our woodland birds,—among others, in the more original habits of the beautiful and ever interesting Black-throated Green Warbler.

In the middle of June of last season (1902), I was agreeably surprised to discover a pair of these wildwood rangers in full song, and actively gleaning their insect prey, in a large, deep-shaded orchard, five miles west of this town. For some time my companion and I watched the movements of both sexes among the foliage, and listened to the song of the male with deep interest. This performance was effected in a very animating manner, but in a rather doleful tone, and much resembled the song of the White-crowned Sparrow, but was more subdued. This was the nesting time of the species; I was, therefore, in hopes of finding their nest, and for a time my hope of collecting the eggs seemed about to be realized, as I saw the female fly to the top of a tall apple tree and alight beside a newly-formed nest. On examination I found the nest completed, but it contained no eggs ; it was composed of materials much similar to that of a Chipping Sparrow, but not nearly so bulky as the nests of this species usually are. However, neither time nor circumstances permitted me again to revisit the site till the nesting season was over ; but I feel certain that the bird nested in that orchard the past season.

On the 11th of May past, I noted this species, the first time for the season of 1902, in a lowland wood north-west of this town. It was then in its beautiful spring plumage and mingling its song notes with those of a number of other Warblers—also new to the season—and all were actively searching for their insect food among the budding branches of the forest trees. Here, I have no doubt, some pairs of them remain through the season, and nest, as I think, also in another tract of woods to the south of the town, where every June I hear the song of the male of this species.

The Black-throated Green Warbler is a lively, active species ever on the move during daylight hours, and from the time of its spring advent till the nesting period is over, a constant and not unpleasing songster. This period extends from the second week of May to the first week of July, after which it is heard no more for the year, though it is probable that it remains in the vicinity of its summer home till the advent of September, when, with other species of its family, and the other woodland birds, it leaves this country and begins its aerial voyage towards its southern home, which appears to be the shores and islands of the Gulf of Mexico. In February the species begin their northward return journey ; but it is the early days of June before the more adventurous reach the northern limits of their wanderings. Thus, year after year, such repetitions of movements constitute the principal features of the life history of the species, but it cannot with certainty be told what term of years constitutes the "old age" of a warbler : probably ten to fifteen years is with them the allotted span of existence.

The Hon. G. W. Allen, of Toronto, one of the pioneer ornithologists of Ontario, writing to "The Ontario Farmer," says regarding this species: "The Black-throated Green Wood-Warbler is occasionally seen through the summer in this part of Canada; but I have never met with the nest of this bird, and am inclined to believe that the majority of them breed farther north. They appear here in little parties of twos and threes on their southward journey in September, and are said to spend the winter in the tropics. Their plumage is very beautiful. The male has the upper parts a very light yellowish green; the front of the head, a band over the eye, the cheeks and the sides of the neck and the upper parts of the sides of the body, are deep black; the rest of the lower parts are white, tinged with yellowish; the quills and tail feathers are brownish-black, the secondary coverts largely tipped with white, as are the tail feathers, of which the greater part of the outer three, and a patch on the inner web of the fourth, are white. . . . Those who have seen the nest of this species describe it as being placed among the thick branches of an evergreen tree, from 20 to 50 feet off the ground, and being composed of small twigs, strips of pine bark, fibres of wood, and horse-hair; and the set of eggs to be four in number, of a whitish hue, spotted with reddish-brown."

Mr. Vennor, in his Notes on the Wood-Warblers of Montreal, 1861, does not mention this species; but Mr. D. Wintle, in his "Birds of Montreal," 1896, records it as a "common spring migrant," but a scarce summer resident. "I saw one on June 18, 1887, in Mount Royal Park, and shot a male and a female specimen on July 1st, 1885, at Calumet; also observed two or three young of this species on August 27, 1892, in Mount Royal Park. Observed here in spring, in May, and in autumn, from October 4th to 10th."

Mr. McIlwraith, in his "Birds of Ontario," says: "The Black-throated Green Warbler is a regular visitor in spring and fall. It appears earlier in spring than some others of its class, and soon announces its arrival by frequent utterances of its characteristic notes, which are readily recognized when heard in the woods."

Mr. M. Chamberlain, of St. John, N.B., wrote re[illegible] this species: "It occurs from the Atlantic border to Lake [illegible], and north to Point-des-Monts. It is said to range to the Great Plains, but has not been observed in Manitoba."

In Cook's "Birds of Michigan," this species is recorded as a common spring and autumn migrant, yet as nesting in various parts of that State.

Mr. C. W. Nash, in his "Birds of the Garden," has written regarding this species: "With the Black-throated Green Warbler we have more concern (than with the Black-throated Blue Warbler); it is quite common and regularly breeds throughout its range in the province (of Ontario); though, unless there are a good many green trees about, it is not likely to stay in the garden to nest, its preference seemingly being for rather open places, where cedars and hemlocks are dotted about. In some large gardens I know, I find it settled every summer. It has a rather peculiar sort of song, which it keeps up all through the season, even in the hottest weather, when nearly all birds are silent. It leaves us early in October, and goes south to Central America."

REPORT OF BOTANICAL SECTION, 1902.

During the spring and summer of 1902 there was a revival of interest among the botanical members of the Club, and more work was done than has been accomplished in any season for some years. Foremost among those who were at work were Dr. Fletcher and Professor Macoun, who studied special genera and re-visited many of the localities at which the rarer species growing in this vicinity are to be found. Many new stations of little known species were discovered and several new species were added to the local flora.

Dr. Sinclair and many of the Normal School students were at work both in the spring and in the autumn, and a greatly increased interest in botany was noticeable among the students.

Though comparatively few of those attending the Ottawa University are members of our Club, we are pleased to record here that many of the pupils, with their instructors, made frequent excursions into the fields and woods of the vicinity. These have resulted in not a little new information concerning the distribution of our local plants.

Dr. Cephas Guillet continued his field instruction to the boys attending his school. Over 500 species were noted in flower.

In addition to the general work recorded above, many individual members of the Club were active in field research.

One of the results of this renewed activity in botanical study has been the inauguration of bi-monthly meetings of the botanical section. Two meetings have been held this year, the first at the house of Dr. Fletcher, the second at Prof. Macoun s. The principal object of these meetings is to enable working botanists to keep in touch with one another and so make it possible for them to work with greater advantage to themselves and one another.

Dr. Fletcher is growing all the species of Canadian violets obtainable, and he now has all of the Ottawa species, most of which are thriving under cultivation. Plants of nearly all have been grown from seed.

April 19. A sub-excursion of 150 to Aylmer. *Epigæa repens* was collected in perfection of bloom. *Acer rubrum* was also in full flower and exceptionally bright in colour this year.

April 26 was too wet for a sub-excursion.

May 3. Sub-excursion to Beaver Meadow, Hull, which about 60 attended.

May 10. Sub-excursion to Rideau Park ; 40 turned out. A severe frost the previous night (13 degrees) had spoiled nearly all flowers open at the time.

May 17. First excursion ; 300 attended. A large botanical class of Normal School students.

May 26. Sub-excursion to Rockliffe. Violets in bloom ; but, as a class, these plants were much injured this year by the frost of May 9-10.

May 31. There was a small sub-excursion to Dow's swamp.

The long autumn of 1902 with good collecting weather enabled the botanists to do a great deal of active field work ; sub-excursions were held during September to Rockliffe, Aylmer, Chelsea and Hull.

The first severe frost was not till October 4. On September

6 a large botanical excursion was held to Gilmour's Grove, Chelsea ; 150, including many of the Normal School students, attended. Violets in fine fruit were collected, and the differences between the species represented were explained by Dr. Fletcher.

J. M. MACOUN.
CEPHAS GUILLET.
D. A. CAMPBELL.
A. E. ATTWOOD.
S. B. SINCLAIR.

ANOTHER INSECT COLLECTOR.—Dr. Fletcher's note in the last number of THE NATURALIST calls to mind a similar interesting incident noted on the 8th June. In this case, however, it was a young Red Squirrel, which was busily engaged eating a June Beetle (*Lachnosterna*). These beetles, especially when they are as abundant as during the present year, doubtless furnish food for many of our small native mammals.

ARTHUR GIBSON.

SUB-EXCURSIONS.

The fourth weekly outing of the Club was the second visit to a part of that division of the Ottawa district henceforth to be known as Quebec West. On the afternoon of Saturday, May 2nd, at least 120 members and friends rambled about the Beaver Meadow, collecting specimens in various branches of natural history.

The most striking characteristic of the amateur botanist of this season is a desire to acquire at least a nodding acquaintance with our native trees. So closely were the leaders pressed in the work of identifying twigs and sprigs that they fervently wished that either night or a professional botanist might come.

At 4.30 about one hundred persons assembled to hear the speakers. Dr. Sinclair presided. Mr. J. C. Spence gave the names of all the plants in flower that were submitted. Mr. A. E. Attwood said a few words on the principles observed in naming plants. Mr. S. E. O'Brien showed a fine specimen of the Walking Fern (*Camptosorus rhizophyllus*) which he had found among the rocks to the west of the Beaver Meadow. This fern is rare but is also found in several other places near Ottawa.

Mr. W. J. Wilson informed the audience that the best example in this region of a moraine was to be found directly north of the Chaudiere bridge. The mass of débris is pierced by the railway that crosses the Royal Alexandra bridge. In the course of his remarks he said that, while a mineralogical specimen should always have a fresh surface, a rock that has been long exposed is often more serviceable for palæontological purposes, as the fossils are then weathered into prominence.

Mr. Andrew Halkett exhibited a classified collection of small animals captured during the afternoon. After speaking at some length on the various representatives of the different orders of Invertebrata, he showed two species of snakes—the Garter Snake (*Eutainia sirtalis*) and the Grass Snake (*Leiopeltis vernalis*). There was a mild protest offered when he asserted that the snakes and the members of the audience belonged to the same class—Vertebrata.

A party of entomologists and botanists accompanied by Dr. Fletcher and Mr. Gibson went as far as Fairy Lake and made very interesting collections. Unfortunately, this party got back to the rendezvous too late to take part in the addresses.

A. E. A.

On the 9th May about 200 members and friends of the Club met at the southern end of Preston street to enjoy the fifth sub-excursion of the season to the Central Experimental Farm. Here they were met by Dr. Saunders and the officers of the Farm. As an unusually large number of leaders in all branches of the Club's work were present, their presence added much to the value and success of the outing. After a short stop in the woods bordering St. Louis dam, where the spring flowers of *Viola Dicksonii*, *V. pubescens* and *V. canina*, var. *sylvestris*, were in excellent condition, a start was made for the Arboretum and Botanic Garden of the Experimental Farm. Here a considerable time was spent in examining the large collection of shrubs and trees. Those which were most admired, were the pines, larches and spruces. The different species of ash also attracted attention. Some of the early butterflies were noticed, but none of them were numerous. The early white *Pieris oleracea-hiemalis* was the most abundant, and some nice specimens were secured. A single example of the small Fritillary (*Argynnis bellona*) was seen flying; the 9th May is an early date for the species.

Shortly after 5 o'clock the company gathered near the Director's house, where Mrs. Saunders had kindly prepared most welcome refreshments. At the request of the President, Dr. Saunders gave an interesting talk relating to some of the work carried on by the Dominion Experimental Farms. Special mention was made of the value of the experiments in the hybridizing of fruits for the North-west, which gave every promise of great success. On invitation from the President, several questions were asked by some of those present, on natural history and farm work. Short addresses were also delivered, appreciative of the good work being done by the Club, by Mr. White, the Principal of the Normal School, and by Father Lajeunesse, of the Ottawa University. Before the members dispersed, the President drew their attention to the presence, in a near-by tree, of the Purple Finch and the Brown Thrasher. These charming birds were singing merrily, each vieing with the other to enchant the visitors with the sweetness of their notes.

A. G.

The excursion of May 30th to Queen's Park, Aylmer, was attended by some twenty members of the Club—mainly from the botanical section. The burnt grass and the scarcity of many of the flowering plants told of the unusual spring drought but emphasized the beauty of the trees and shrubs. Especially worthy of note was the tall, graceful Sweet Viburnum (*V. lentago*), very prominent near the Chute.

During the afternoon Prof. Macoun found *Salix longifolia* and *Salix amygdaloides*, and Mr. O'Brien discovered both species of Hepatica. *Ranunculus septentrionalis* was found along the line of the railway, and a fine patch of the large yellow Water-Crowfoot (*Ranunculus multifidus*) in the swamp. Prof. Macoun and Mr. Clarke came upon a nesting whip-poor-will in a shady, retired spot. The bird floated from the nest in its moth-like manner, and disclosed the full set of two eggs in a mere depression of dead leaves. It alighted near at hand and remained motionless, thus permitting a sufficient description.

The excursionists assembled to listen to short addresses from the leaders. The president, in answer to a request, made a promise of a field guide to the trees of the district. Mr. Attwood explained his system of recording field notes, and Prof. Macoun emphasized the necessity of written observations.

T. E. C.

BOTANY.

MACRAE'S CORAL-ROOT (*Corallorhiza striata*, Lindl.).

A beautiful specimen of this widely distributed, but always rare orchid, was found at Renfrew, Ontario, in full flower, on 23rd May last, by Master John Forgie, who has kindly presented it through Mr. W. A. Stickle, the Principal of the Renfrew Model School, to the herbarium of the Central Experimental Farm. It is a very acceptable addition to the collection. This species, though very local and very rare, is widely distributed. I have received specimens from Masset, Q. C. I. (Rev. J. H. Keen); Victoria, B.C. (J. R. Anderson); Aweme, Man. (Norman Criddle); and Ottawa.

J. FLETCHER.

A DOUBLE TRILLIUM GRANDIFLORUM.

On the 21st of May last, Miss Edith Courtney showed me a very handsome large double trillium that her father had found at Chelsea. Instead of three white petals, it had some twenty-four, arranged, though without perfect regularity, in six groups of four each, the six outer petals being the largest, the others getting smaller towards the centre. It presented the appearance of a beautiful white rose. Unfortunately, the root was not obtained; otherwise, the attempt might have been made to preserve so lovely a variation by cultivation. Is it not possible, however, that such a variety might be produced by cultivation?

CEPHAS GUILLET.

ERRATUM.—In the June number of THE NATURALIST, on page 55, line 3, instead of "hissing sound," read "kissing sound."

HUNTING FOR CATERPILLARS.

By ARTHUR GIBSON,

The study of insect life is so intensely interesting that it is difficult to say which branch of entomology is the most fascinating ; each has its own devotees. One branch of the subject which certainly is exceptionally useful and fascinating, is the collection and study of our native caterpillars. Of late years much has been done in working out the life-histories of American insects, but there is still a vast field in which to make research. The life-histories of our butterflies are fairly well known, but only a very small percentage of the larvæ of even our common moths have been studied. Lepidopterous larvæ can be collected at any time of the year, but the best opportunities are to be found during the summer for acquiring a knowledge of these interesting creatures.

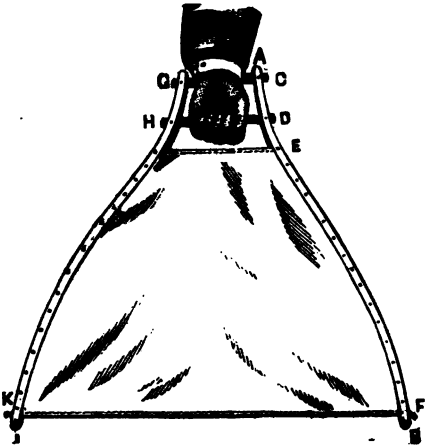
It is strange that most people seem to regard caterpillars as repulsive, horrid things ; but this, of course, can only be accounted for by the fact that they have never really taken the trouble to look at one. None of Nature's children are horrid. It is only our unfortunate uninterestedness that is accountable for such inaccurate views. There is really nothing in nature which is not beautiful, if carefully examined and properly understood, and, even those caterpillars which are thought by many to be most repulsive, are of themselves not at all responsible for feelings akin to disgust or horror. When exhibiting a case of butterflies or moths, it is quite usual for the onlooker to make some remark regarding the beauty of the specimens ; but, when shown the caterpillars of these same species, our visitor, as a rule, shrinks back, and a remark not at all corresponding with the first exclamation is heard. Although presenting sometimes a rather formidable appearance, with the exception of a very few kinds, which are provided with irritating hairs, caterpillars are quite harmless. Some of the Sphingidæ will jerk their heads from side to side and even snap their mandibles, but they are unable to bite anything thicker than the edge of a leaf, as a very slight examination will show.

Insects are so abundant that they can be found at any time, and almost in any place. Their presence everywhere offers a ready means for learning something of the ways and habits of the creatures which constitute so large a portion of the animal kingdom. Even a cursory study of any of our caterpillars will soon convince one that there is much of interest as regards the habits of even the commonest species, many of which show remarkable traits.

During the first warm days of spring, even before the snow has entirely disappeared, reddish or mouse-coloured hairy larvæ, about an inch in length, are often seen walking across the sidewalks of outlying streets, or especially along the railroad tracks. These are the caterpillars of *Phragmatobia rubricosa*, Harr., and are chiefly interesting to local collectors in view of the fact that two distinct forms of the moths have been met with at Ottawa, and it is not at all improbable that we may have here two good species instead of one, as now recognized by standard lists.

The spring time is also opportune for the collection of arctiid and noctuid larvæ, under stones, etc., particularly in open places. Along the grassy sides of railroad tracks there are usually numbers of strips of bark, broken pieces of plank, etc.; and, underneath the same, many of these larvæ, which pass the winter about half, or nearly full grown, can be found hiding at that time of the year. The old leaves of mullein plants also harbour various kinds of caterpillars.

After the May and June, by which time many caterpillars will have hatched from eggs laid during those months, doubtless the most prolific way of collecting larvæ is by beating them off the plant they are feeding upon, into a beating net. Dealers in entomological supplies have for sale nets made specially for the purpose ; but the accompanying figure shows a good pattern for an easily made net, which can be held beneath the plants with one hand, while the larvæ are beaten down on to it with a light rod held in the other hand. This beating net consists of a stick on each sid [illegible] lat sheet of cotton between, three feet wide at the top and o [illegible] at the bottom. Two cross bars close together at the base allow of this net being easily held by taking the upper bar in the left hand, so that the lower bar rests against the back of the wrist. We have used these nets in connection with our official field work and have found them very serviceable. Dr. Fletcher has recommended them in his departmental reports as of much value in collecting various insects which are troublesome to the market gardener, etc., so that they can be afterwards destroyed.



There are many kinds of caterpillars, however, which cannot be collected by beating, or gathered from beneath stones, bark, etc., on the ground. Some of these are borers, which pass the whole of their larval existence feeding inside the stems and roots of various plants. The caterpillars of the genus *Papaipema* (*Hydrœcia*) have, within the last few years, been given special attention by some students. These larvæ are true borers and work within the stems of burdock, goldenrod, etc. *Papaipema cataphracta*, which bores in burdock, is a common species at Ottawa wherever the plants are numerous, and the presence of the caterpillar can usually be detected by the withering and discolouring of the tips. The caterpillars of *P. appassionata*, which have only recently been discovered, were found, by Mr. Henry Bird, of Rye, N.Y., feeding in the roots of the Pitcher-plant (*Sarracenia*). Last season, when at the Mer Bleue, the writer examined many pitcher-plants, but could not find any larvæ, although in the root of one plant the work of a noctuid caterpillar was detected, as well as some frass, but of course we do not know that it was of this species.

Other larvæ of smaller species of moths form various kinds of cases, inside of which they live and change to the pupal state, and some kinds even produce galls, or more or less decided enlargements of the stems of their food plant. These of course can only be collected by hunting for them at the proper time. A large number of still smaller caterpillars are leaf miners feeding on the soft cellular tissues under the epidermis. The moths of these leaf miners are very beautiful, but delicate little creatures.

The tips of plants may often be seen drawn together by threads of fine silk, and, if the leaves are separated, the caterpillar which caused this tying can be collected. A species of economic importance, because it does considerable damage at times, has been called the Greenhouse Leaf-tyer, from the habit it has of drawing the leaves of the plants together, and fastening them with silk.

The pleasure derived from collecting caterpillars and watching their varied habits, will be found very helpful and fascinating. There are many lessons which they teach us, from which we could derive untold benefit. Every species is worthy of study, and, as there is so much yet to be done in working out the life-histories of our butterflies and moths, particularly of the latter, there is in this branch ot study alone a vast field for much original investigation. The value of such work cannot be overestimated. From an economic standpoint, it is only when a complete knowledge of all stages is known that we can hope for the best results in combating the ravages of many injurious species. I feel sure that anyone who devotes any time to the rearing of larvæ, will not regret the hours spent in collecting and watching their specimens. On the contrary, however, they will be surprised at the interest they find themselves taking in the development of their captures, and even if they should not be successful in bringing the specimens to maturity, they will not, I venture to say, allow this disappointment to lesson the interest aroused in these creatures.

NATURE STUDY—No. III.

(The following is the concluding summary of Dr. S. B. Sinclair's lecture on "Nature Study in American Universities," delivered to the Club on February 10th. A *full* report is given in the May and June numbers of the Educational Monthly of Toronto.)

It may be said that experimentation and investigation have established the following general principles regarding Nature Study.

1. Nature Study should not be considered the be all and end all of education. The humanities and mathematics must always be prominent subjects in a rationally constructed school curriculum. It is probable, however, that with wiser selection of subject matter and method in every department, better results will be secured with less expenditure of time and energy than formerly, and that the introduction of Nature Study will not prove an additional burden to the student.

2. Nature Study should have a place in the curriculum of every grade in every elementary school. The work in early years should consist of that comparatively spontaneous, non-technical and undifferentiated study of surroundings which develops in later life into a scientific study of Nature with a definite problem and by careful and accurate laboratory methods.

3. The aim of such study in the elementary school is not so much information as character. The purpose is not at the beginning to furnish a scientific laboratory training or to fill the mind with scientific facts, but to develope an attitude—a power of interpretation and appreciation of Nature and also a power of self-expression, which will enable the child to gain better control of himself and of his surroundings, to live a fuller life and to be of greater service in society than he otherwise would be.

4. In the selection of materials and methods, this aim should be kept in view. For example, the study of the various processes by which the wool of the sheep is worked up into cloth, is usually of greater value educationally to the city child than to the country child, who may already be fairly familiar with the facts. Thus, it is impossible to lay down a definite course of study which will be adapted to different school conditions. The material studied should be closely related to the problems of child life experience

and should be adapted to the hunger and needs of the child. During the symbolic or play period of later infancy, and during the keenly observant but still comparatively unreflective period of early childhood, emphasis should be cast upon the sensory-motor, the historic, the individual, the social, rather than upon the abstract, the technical, the scientific.

In the primary grades of the school, therefore, the greatest stress should be placed upon activities connected with the child's immediate experience, involving a study of his surroundings—geography and history.

While the work should be purposive, it should not to any great extent appeal to the *commercial* instinct. The child is usually specially interested in certain living forms of plants and animals ; but he is not interested in *all* such forms, nor are inanimate objects devoid of interest to him. The construction of a thermometer or a study of various forms of water may lie closer to the child's life interest than an investigation of certain animal forms.

The material should not be selected on the basis of trivial superficial interest, but should be of such a nature that when the child realizes what is there and what it means to him, it will become interesting. The despised and persecuted common toad, usually looked upon as an ugly venomous and loathsome beast, becomes an object of genuine interest when the child learns that the toad is entirely harmless, that it is one of the most humane and valuable fly traps yet discovered, that it destroys large numbers of injurious insects, that its life cycle extends over thirty years, that it is easily tamed and that it is destined to become a valuable and highly appreciated domestic pet.

5. The study in the initial stages should not consist of set formal lessons. For example, the metamorphoses of an insect or the development of a plant from seed to fruit may be observed for months, with an occasional brief conversation to organize the facts learned up to the present, and to direct observation for the future. By spending an hour a week, in brief or extended discussion (as the conditions of the case require), much valuable work can be done in every grade. The school garden, and the field excursion, when properly conducted, afford the ideal conditions for elementary Nature Study.

6. While supplementary readers, pictures, lantern illustrations and prepared specimens are of great service when properly used, their advantages can easily be over-estimated. Nothing can take the place of living interest and actual contact. The pet squirrel that the child knows as a companion and cares for day by day, the flower which he has planted and watered and provided with proper light, heat and moisture conditions, is a thousand times better than any dead specimen.

7. Technical terms and static classification should not to any great extent enter into the initial work. In this connection, Burrough's criticism is well taken when he says: "The clerk of the woods is so intent upon the *bare fact* that he does not see the spirit or the meaning of the whole. He does not see the bird; he sees an ornithological specimen. He does not see the wild flower; he sees a new acquisition to his herbarium. In the birds nests he sees only another prize for his collection. Of that sympathetic and emotional intercourse with nature which soothes and enriches the soul, he experiences little or none."

8. The best results will never be obtained until Public School classes are reduced to a sufficiently small number (say a maximum of forty) to admit of individual supervision, and until teachers know enough of natural science to make them enthusiastic and wise leaders. Under present conditions in graded schools, the latter difficulty may in a measure be overcome by an interchange of teachers of different classes, which will make it possible for the specialist in science to teach in different grades. A primary class in a well organized school does not suffer by a change of teachers several times during the day.

9. Nature Study should be correlated with other cognate studies, especially with form study, drawing, and colour work. The representations should be mainly from life and imagination and not from copies. Modelling should form an important feature.

The subjects studied in Nature lessons may be made the basis for drawing lessons. The study and representation of abstract conventional type forms should not precede the investigation and expression of the forms of the individual objects met with in the child's experience. It is not surprising that the schools do not develop more and better artists, when we consider the character of the work done. With but few exceptions colour is never referred to, and much of the drawing work is conventional and lifeless.

All who have observed the results of a sequential course in the study of life forms accompanied by expression in model and colour work from the kindergarten through the entire school course, must be convinced of the great value of such training. So long as the public are content with the notion that the acme of school art is achieved when pupils can draw straight lines to vanishing points, little will be accomplished.

Such a reform would necessitate the securing of teachers of drawing who are themselves artists and who possess sufficient knowledge and love for Nature to enable them to guide their pupils to artistic expression. This would involve an additional expenditure for teacher's salaries ; but, even from the commercial standpoint, the extra amount would be a good investment.

WHAT IS NATURE-STUDY?

Nature-study from the public school teacher's point of view is the maintaining in educative directions of the child's natural interest in its environment. For such work the knowledge of paramount importance to the teacher is the knowledge of child-nature ; the knowledge of plants, animals, earth and sky, though necessary, is secondary. Learning to train the child how to use the materials of knowledge, obtained at first-hand through sense-activity, in the proper development of the intellectual, emotional and volitional phases of its being, is the indispensable preparation of the successful teacher of nature-study. The name is unfortunate because it is so liable to be regarded as the equivalent of acquiring knowledge of nature. Even some who are writing books and giving lectures to teachers on nature-study (*sic*) are substituting information for education. Educationally, the study of nature may be different from nature-study and as inferior to it as a horse-chestnut is different from and inferior to a chestnut-horse.

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PETROGRAPHY OF SOME IGNEOUS ROCKS OF THE KETTLE RIVER MINING DIVISION, B.C.

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The district from which the following specimens were collected is a comparatively new mining locality, situated between lat. 49° and 50° and long. 118° and 119°.

The specimens were collected by Mr. W. F. Robertson, Provincial Mineralogist of British Columbia, and sent to Dr. Frank D. Adams, Professor of Geology at McGill University, who intended to make a microscopical examination of them. As, however, the writer was working in the Petrographical Laboratory of McGill University at the time, Dr. Adams kindly consented to hand them over to him, and the following descriptions have been written with Dr. Adams's help and under his supervision.

As no petrographical work has hitherto been done in connection with this district, the writer decided to publish his observations, hoping they may be of interest as descriptions of rocks immediately connected with ore deposits of what may prove to be an important mining region.

The sentences between inverted commas are quotations from Mr. Robertson's notes on the respective occurrences. These, together with the descriptions of localities, are taken from his report on the district, which appeared in the Annual Report of the Bureau of Mines of British Columbia for the year 1901. The numbers are taken from Mr. Robertson's specimens.

Numbers 117, 120, 138, 125 were all collected from Aspen Grove.

No. 117.—Taken from Big Watchman Mine.

". . . . A rock which has the appearance of being a volcanic agglomerate or breccia containing considerable lime."

Hand specimen is a fine-grained greyish rock, showing a few stains of green carbonate of copper on the joint planes.

Under the microscope, the rock is seen to be composed of a fine-grained groundmass of plagioclase felspar, in which are imbedded large porphyritic crystals of felspar twinned according to Albite and Carlsbad laws, some untwinned individuals and some microperthitic intergrowths of albite and orthoclase. There are also some forms which are now entirely filled with magnetite and chlorite, but which, from the shape, once belonged to some ferromagnesian constituent, in all probability hornblende. There are areas in the section which consist of angular and subangular fragments, giving to it a brecciated appearance and which once evidently belonged to some closely related volcanic rock caught up by this one while it was in a molten condition.

The rock is an altered andesite, which in some parts of the mass probably passes into an andesitic tuff or breccia.

No. 120.—From Big Sioux Mine, Aspen Grove.

"The country rock appears to have been of igneous origin and is somewhat similar to that of the rest of the camp; but at this point it has been considerably altered and now approaches serpentine."

The hand specimen shows a massive fine-grained greenish-coloured rock, having green carbonate of copper stains in the cracks and on the weathered surfaces.

Under the microscope, the rock is seen to be very much altered and to consist of a groundmass and phenocrysts. The former makes up a very small proportion of the rock and consists of small plagioclase crystals. The phenocrysts consist of felspar, in large laths, showing twinning according to both the Albite and Carlsbad laws, some individuals having these two combined, thus allowing of the determination of their composition by Michel Lévy's admirable method.* By this it was found such individuals consisted of an oligoclase with the composition $Ab_3 An_1$. There are also aggregates of epidote and chlorite, frequently having definite outlines, which give them the appearance of being secondary after augite. Calcite is also present as a secondary mineral; and, as accessory constituents, ilmenite, leucoxene and sphene are found in considerable quantities.

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* See Becker, G. F., on the Determination of Plagioclase Felspars in Rock Sections. Amer. Jour. of Sc., May, 1898.

On account of the very considerable quantity of augite which was present in the original rock, as well as on account of the large proportion of iron ore present, the rock possesses a distinctly basic character, and consequently is better classed as a basalt than as an augite andesite.

No. 125.—From the Medal Mineral Claim, Aspen Grove.

"It is an extension of a dyke of from 10 ft. to 12 ft. wide, of lighter colour than the general rock, inclined to be porphyritic in structure and containing much lime; there is an impregnation of copper sulphide, but not of important quantity."

The hand specimen shows fine-grained reddish-looking rock containing greenish chlorite aggregates and a little chalcopyrite.

Under the microscope, it is seen to be of volcanic origin, being composed of idiomorphic plagioclase containing zonally arranged alteration products and some individuals of pale green augite. The rock in some places shows a brecciated structure, the phenocrysts having broken outlines, while elsewhere may be seen aggregates of epidote individuals, apparently representing inclusions of some highly altered foreign rock. There are also certain forms now outlined in hydrated oxide of iron and filled with decomposition products, highly suggestive of the former presence of olivine. Biotite is noticeable, but is in nearly all cases wholly or partially altered to chlorite.

Native copper is present in the slides and, from its appearance, seems to be of secondary origin. It borders the plagioclase crystals in narrow strings and also occurs in bunches, running off in little strings which pass through the cracks. It sometimes occurs filling spaces which were once occupied by olivine.

The rock was probably a basalt.

No. 138.—From the Magpie Mineral Claim, lying to the west of the Big Sioux.

Hand specimen is a fine-grained greenish rock, impregnated with pyrite and chalcopyrite.

Under the microscope, the rock is seen to be much altered and to present a distinct porphyritic character, the phenocrysts being relatively more abundant than the groundmass, which is composed mainly of felspar laths Of the phenocrysts, the felspar is by far the most abundant, some having good idiomorphic forms, while others show broken individuals. Augite is also abundant in medium-sized grains, which, however, have undergone considerable alteration, in some places being completely changed to epidote and chlorite. Calcite is abundant as an alteration product, and magnetite as an accessory constituent.

The rock bears a distinct resemblance to No. 120, but is relatively richer in felspar and may be considered to be a highly altered basalt.

No. 13.—Fine-grained dark igneous rock, with markedly porphyritic structure. From an exposure on Nevertouch Creek, near its junction with Kettle River.

Under the microscope, the rock is seen to consist of a rather fine-grained groundmass, in which are imbedded well-defined phenocrysts, which like the groundmass consist of plagioclase and augite. Many of the smaller felspar grains are untwinned, and all have undergone considerable alteration. Augite is quite abundant in almost colourless grains, showing much alteration to chlorite. It has a maximum extinction of 39°, which, with its other characteristics, determines it to be diopside. A few crystals which, from their general appearance and high double refraction, closely resemble olivine, are also present. Some biotite occurs in the slides, but is very much altered, now consisting largely of chlorite. A small amount of epidote is present as an alteration product, and ilmenite, which occurs associated with sphene, is abundant as an accessory constituent.

The rock is an augite andesite, or possibly, as suggested by the structure, some dyke rock of similar composition.

No. 14.—From the Gorge at the mouth of Canyon Creek. where it enters Nevertouch Creek.

"The rock formation on either side of the gorge is of igneous origin, a fine-grained dark diabasic rock, inclined in places to be porphyritic in structure."

The collection contains two specimens from this locality, representing two different varieties of the same rock, one showing a massive and porphyritic character, while the other is scoriaceous.

Under the microscope, the rock is seen to consist of a microcrystalline groundmass composed of minute laths of felspar, showing a trachytic structure and often a fluidal arrangement. In the groundmass are included well defined phenocrysts of plagioclase, augite and biotite, also a few phenocrysts composed of a microperthitic intergrowth of two felspars, one of which may be orthoclase. Some of the plagioclase individuals are twined according to both the Carlsbad and Albite laws, which when examined by Michel Lévy's method were found to have the composition $Ab_1 An_1$.

In the second section, which is a highly vesicular variety, the vesicles nearly all show a narrow border of what appear to be zeolites which are just beginning to form in the cavities. The biotite, in this section, is dark brown in colour and contains little black needles arranged in skeleton patterns, which probably consist of rutile derived from the partial decomposition of the mica. The groundmass of this section is relatively more abundant than the vesicles and it is therefore not a true pumice, though it approaches one in appearance.

The rock is very fresh ; and, from a comparison with the other rocks described, it would appear that this is a comparatively recent lava flow. It has the character and mineralogical composition of an andesite.

No. 17.—"Reddish-grey rock from the north side of Slate Creek, near its mouth."

Highly decomposed basic igneous rock, having the composition of an augite andesite.

Under the microscope, the rock is seen to possess a well marked porphyritic structure. The groundmass is microcrystalline, consisting of minute laths of felspar, which often show a fluidal arrangement, and a little chlorite and oxide of iron, representing alteration products of some ferromagnesian constituent. Through this are distributed large well defined lathshaped crystals of plagioclase now almost entirely altered to rhombohedral carbonates; also phenocrysts of some ferro-magnesian constituent now completely altered to a mixture of rhombohedral carbonates, quartz, chlorite and oxide of iron. The rock shows a few vesicles now completely filled with decomposition products, such as chlorite and calcite. A few well defined hexagonal crystals of fresh apatite of large dimensions occur scattered through the groundmass, also a few veins of calcite.

No. 8.—Fine-grained grey rock from Brewer Creek, Upper Kettle River.

"About one mile from the mouth of Brewer Creek and in line with the foothills, there is an outcropping of the solid rock formation exposed in the banks of the creek. The formation here seems to be chiefly granite, alternating with dykes of fine-grained basic volcanic rocks, and occasionally, apparently, with still more recent and very acid dykes."

The sample in question is taken from one of the acid dykes.

The hand specimen is a dyke rock, medium fine-grained and grey in colour.

Under the microscope, the rock is seen to be much altered and to be composed almost wholly of altered felspar crystals twinned according to the Carlsbad law, on account of which, as well as from the total absence of albite twinning, they were assumed to be orthoclase. Small narrow laths of biotite are abundant, which, however, have undergone considerable alteration, in most cases being changed to chlorite. Secondary quartz, associated with calcite and apatite, is also noticeable, and, as accessory constituents, magnetite and pyrite. The groundmass, which consists of small felspar individuals, also has a small amount of quartz, possibly secondary, distributed through it. There are a few vesicular cavities filled with zeolites.

The rock corresponds in character and composition to a minette.

No. 53.—"Porphyrite from Rebecca Mine, Rock Creek, west side of Kettle River, 4 miles above Rock Creek. Elevation 4,000′."

"The chalcopyrite is carried by a quartz vein which cuts this rock. Value of mineral, $22 per ton."

The hand specimen shows a compact fine-grained pale-greenish-grey rock.

Under the microscope, it is seen to be very highly altered and to consist of a trachytic groundmass of plagioclase laths interspersed with grains of epidote and chlorite, in which are imbedded larger individuals of plagioclase, and forms which have once been occupied by phenocrysts of some ferromagnesian constituent now entirely altered to chlorite, epidote, zoisite, quartz and calcite.

The rock is too much altered to enable a determination of its precise character to be made, but it is evidently some basic igneous rock allied to andesite.

No. 30.—From the country rock between West Bridge and Stuart's hotel.

Hand specimen shows fine-grained pink-coloured rock, in which may be distinguished phenocrysts of hornblende, biotite and plagioclase.

Under the microscope, the rock is seen to be composed of a microcrystalline groundmass of felspar and quartz, in which are imbedded phenocrysts of plagioclase containing inclusions of some alteration products ; also biotite altered in many cases to chlorite, associated with which may often be seen sphene. There are also a few fresh-looking quartz individuals, and outlines now entirely filled with quartz, calcite, chlorite and epidote, which were once occupied by some ferromagnesian constituent, probably augite, as they often show forms indicative of that mineral. Magnetite and apatite are present as accessory constituents.

The rock is an altered andesite.

It will be seen from the foregoing descriptions that most of the rocks described are andesites or closely related rocks. No. 14 presents a striking contrast to the others in that, while they are much altered, it is fresh and has every appearance of being a comparatively recent eruptive.

The occurrence of native copper in No. 125 is interesting, and its secondary nature is very plainly shown. It has no doubt been derived from the chalcopyrite by reduction.

NOTES ON THE NESTING HABITS OF THE BROWN CREEPER AND HUDSONIAN CHICKADEE.

By L. McI. TERRILL, Montreal.

In an article on the Brown Creeper someone has observed that this bird searched for its food as if it had lost the one thing necessary to life, and ignored the onlooker completely in its endeavours to find it. Nevertheless, I had occasion, on July 14th of this year, to find a bird startled out of its monotonous occupation. Whilst walking through a piece of hardwood, interspersed with small clumps of evergreens, and bordering on a large cedar swamp, I heard a bird uttering peeps of alarm, and, on looking for the cause, saw a Brown Creeper in a very nervous state, flitting from tree to tree without thinking of its usual occupation. Thinking there was a nest, I started towards a likely-looking balsam stub, and, on striking the tree there was a great commotion at its base, whereupon several young creepers fluttered away in different directions. This was evidently their debut from the nest, and instinctively they flew to the nearest trees and ascending spirally, picking the tree at intervals with weak little pecks, commenced their tradional life search.

To return to the nest, I found that I had broken off a large piece of bark about two feet from the base of the stub, thus disclosing the nest, which was fastened to the loose bark with threads of spiders' silk. It was a very deep structure though necessarily much flattened (as the bark was only about three inches from the trunk at its widest) in the shape of an elongated one-sided wedge. It was composed of dead lichen-covered twigs of spruce, balsam and tamarac, thrown together in a very loose mass with a lining of shreds of the inner bark of balsam. Its outside depth measured eight inches, the diameter parallel with the trunk five, and the other diameter two and one-half. The bark and trunk formed the boundaries of the nest cavity, which was perfectly flat. The nest also contained one infertile egg, which was rather elongated, of a shining creamy white slightly flecked on the larger end with reddish flesh colour.

I counted six young birds which, with the infertile egg, made seven originally contained in the nest.

On July 22nd of this year, whilst tramping through a large cedar swamp, I became interested in the actions of a Hudsonian Chickadee. I watched it for some time searching for insects, when suddenly it disappeared behind a small cedar with a larva in its bill. I did not expect to find a nest, as the top of the tree was green, but, on going around on the other side, perceived a small almost circular hole with jagged edges, about twelve feet from the ground. On rapping the tree, the bird left and became very much excited, nervously flitting back and forth from the nest. Cutting away a portion of the wood, I found the nest to contain young a few days old, six of them, I think. The spot chosen for the nest site was about the best that could be found in the swamp, situated, as it was, on a small spruce knoll near by an ice cold spring which fed a small brook. The tree, as I mentioned, was still green at the top, but from the nest cavity down was decayed and hollow at the core. Returning some time after this, to give the young a chance to vacate, I found the nest to be about ten inches below the entrance hole, which was two inches in diameter. It was composed of particles of moss, lichens and strips of soft inner bark of the cedar, felted together with rabbit's and deer's hair.

MEETING OF THE BOTANICAL BRANCH.

The eighth meeting of the Botanical branch was held at the home of Dr. James Fletcher, Experimental Farm, on Thursday, May 21st. The meeting was called for seven o'clock instead of eight in order that the members might see the many interesting wild plants growing in Dr. Fletcher's garden, especially the violets, of which he has made a special study and which were then in fine condition. Among the interesting plants growing in the garden were *Erythronium grandiflorum*, var. *minor*, and *Claytonia sessilifolia* from British Columbia, which appeared to be thriving well. The variegated form of *Trillium grandiflorum*, mention of which was made in a previous number of THE NATURALIST, was also seen growing here and proved an interesting study, also *Syndesmon thalictroides*, and *Ranunculus fascicularis* from Hamilton, Ont. Most of the time was spent in studying the violets, of which there was a fine collection. These had been grown in pots, so that each species might be kept separate, and were remarkably vigorous and full of bloom. A table was made ready in the house and twenty-nine pots were brought in from outside, where they had been plunged. A general discussion on violets and, on Dr. Greene's recent discoveries and descriptions of new species, preceded a more critical examination of the plants by Dr. Fletcher and the members present. Prof. Macoun said that it was very important in his opinion that, in describing new species, the new one should be compared with one that was better known, as a mere description was not of much assistance in determining a species.

Dr. Fletcher gave a very interesting address, and he had in the living plants such splendid object lessons that much information was obtained, which was impressed on the minds of those present. He said that, when he began collecting first at Ottawa in 1873, he was puzzled at the different forms of violet, which at that time all went under the name of *Viola cucullata.* He showed a sheet of dried specimens having four of these types which he had called at that time alpha, beta, gamma, delta, to separate them. During recent years greater attention had been given to the study of violets; new species had been made out of these forms and named. He said that, although these new species all had some distinctive characteristics, it was impossible to identify them at all times from one character. There was great variation in growth according to conditions under which the plant was growing; there was also great variation in the colour of the flowers. Violets will make fine flowering plants in one year from seed.

Some of the distinguishing characteristics of a few of the species of violets shown were recorded.

V. septentrionalis.—Flowers below the leaves, but prominently in view.

V. subviscosa.—Outline of lower petal prominently boat-shaped.

V. Fletcherii.—Flowers royal purple, very attractive. New leaves erect, acuminate, ciliate.

V. Macounii.—Flowers have a decided pinkish tinge. Petals narrow and all bearded.

V. Dicksonii.—The commonest violet. Petioles and base of petals bristly.

V. cucullata.—Easily distinguished from *Dicksonii* by its dark eye and in the spring being perfectly glabrous. Flowers always above leaves. Grows near spring water.

V. venustula.—Serration of leaf very distinct.

The following is a list of violets shown growing in flower pots, or as fresh specimens from the garden :

affinis,
  do scabrous.
blanda,
cardaminefolia, (Aylmer, Que., type locality),
cognata (Manitoba),
crenulata (U.S.),
consors, (Nova Scotia),
cucullata (Ottawa),
  do (New Brunswick,
  do (Quebec),
  do (Prince Edward Island),
Dicksonii (Ottawa),
  do (Hamilton, type locality),
  do var. *glabrata*,
elegantula,
Fletcherii (Ottawa, type locality),
Labradorica,
Deconteana,
leucopetala (type locality),
Macounii (Ottawa, type locality),
melissæfolia,
nesiotica,
nodosa (U.S.),
ovata,
palmata (U.S.),
papilionacea (U.S.),
prionosepala (type locality),
renifolia,
rostrata,
Selkirkii,
septentrionalis,
subvestita (type locality),
  do (Nepigon),
  do (New Brunswick),
subviscosa (type locality),
vagula (type locality),
venustula (type locality),

The members of the Club present at this meeting were Miss Lee, Dr. Fletcher, Mr. Campbell, Mr. Attwood, Mr. Guillet, Prof. J. Macoun, Mr. St. Jacques, Mr. W. T. Macoun.

W. T. M.

GENERAL EXCURSION TO CHELSEA.

The first general excursion of the season was held at Gilmour's Grove, Chelsea, on Saturday, the 16th of May, and proved to be one of the most successful meetings ever held under the auspices of the Club. Several hundred persons, including members of the Club and students of the Normal School, attended, and were escorted through the woods by leaders of the different branches. Great interest was manifested in the descriptions of the plants, insects, and rocks, given as the objects were found in the open field.

In the way of botanical specimens, we have to mention a large collection of interesting violets. Along the river, the silver maple (*Acer dasvcarpum*) was found growing quite abundantly among the red maples. The former was easily distinguished from the latter by its more deeply cut leaves. The green alder (*Alnus viridis*), which is not found in many places about Ottawa, was common near the river bank.

Seventeen different kinds of butterflies were collected, the rarest species of which was *Thecla niphon*, taken by Mr. Arthur Gibson and also by Mr. A. E. Richard. Other species found by Mr. Richard were *Nisoniades juvenalis*, *N. icelus*, and *Brentis bellona*. Dr. Fletcher secured a specimen of a rare longicorn beetle, *Anthrophylax attenuatus*.

Numerous Batrachians were obtained in a shaded ravine beside a spring, such as the Wood Frog (*Rana silvatica*), the American Toad (*Bufo americana*); and Miss Wilson, of the Ladies' College, at this place, discovered a specimen of Tree Frog, of the species known as *Hyla pickeringii*, which species is of a fawn colour, and singularly marked on the back with an oblique cross. All the specimens of Batrachians were small. A specimen of Grass Snake (*Liopeltis vernalis*) was also captured by a boy and held up for inspection at the time when the addresses were given at the grove.

Leaders who attended the excursion were Mr. W. T. Macoun, the President of the Club, Prof. Macoun, Dr. Fletcher, Dr. Sinclair, Mr. A. E. Attwood, Mr. Arthur Gibson, Mr. Wilson, Dr. Guillet, and Mr. Andrew Halkett. When assembled in the pine grove, before returning to the city, the President called upon Mr. Wilson, Dr. Fletcher, and Mr. Halkett to address the assemblage concerning respectively the fossils, batrachians, and plants which had been found. The excursionists then returned to Ottawa, and numbers of the members and others have since been seeking to study out in closer detail the structure of special objects. All look back to that afternoon in the shaded woods and open field as a promising incentive in connection with the future work of the Club. A. H.

NATURE STUDY—No. IV.

BIRD STUDY.

By W. A. DENT, Whitby, Ont.

In connection with the widespread awakening of interest in Nature Study, some attention has been and is being directed to Birds and their habits. Birds are among the most conspicuous, attractive, and easily observed objects in Nature, and, when attention is once drawn to them, the student is led into other avenues of Nature Study which will be found pleasant and profitable to pursue. A fairly comprehensive and accurate knowledge of most of our common birds is more readily obtained than would at first sight appear possible, and many good books are now to be had which render identification comparatively easy. Of these Chapman's "Bird Life," with coloured plates, and Chapman's "Handbook of Birds of Eastern North America," are probably as good as any. These books are useful in identifying birds, and perhaps also as a guide to their study ; but, to be of any value educationally, our further knowledge must come from a study of the living birds in their haunts and homes.

While children probably do not consciously love nature, they have a curiosity to know more of the living things they see about them, and there can be no doubt that if children were taught more of the things they wish to know and fewer dead uninteresting facts, better educational results would be secured.

A bird which is likely to be more or less familiar to children, particularly in rural schools, is the Bobolink, and a study of its life history will be found most captivating and instructive. The beauty of his plumage and the contrast with the duller dress of the female, his rollicking joyous song, his skill in concealing his nest, his extensive migrations, in the course of which he visits many countries, can be woven into many interesting lessons. The Meadow Lark is an expert decoy, and the sight of a bird endeavouring to decoy an enemy from its young never fails to arouse the most intense interest.

It is unnecessary, however, to leave bird study to those living in the country ; for, in the town in which I am now writing, many very interesting birds regularly make their homes. Omitting the commoner ones, I might mention the Great Crested Flycatcher, Least Flycatcher, Black and White Creeper, Canadian Warbler, Ruby-throat Hummingbird, Black-billed Cuckoo, Catbird, Screech Owl, Cedar Waxwing, Maryland Yellow throat. In addition to these, many marsh and shore birds, such as Grebes, Gallinules, Bitterns, Coots, Plovers, Sandpipers, and even Ducks and Loons, regularly nest and in spite of legal and illegal shooting seem to maintain their numbers fairly well. In addition to these there are, of course, many migrants, including Warblers, Thrushes, &c., which visit the shade trees and orchards during the spring and fall migrations. Indeed the number and beauty of these migrants is generally a revelation to those whose attention is directed to them for the first time. For the purpose of studying nesting and food habits, however, the ever-present English Sparrow will afford a convenient example and may be compared and contrasted with the Robin Every child knows a good deal about these birds in a more or less vague and indefinite way, and methods will readily suggest themselves to the teacher to make this vague knowledge definite and to cultivate a habit of accurate observation.

One of the important practical results which will follow the introduction of the study of birds into the schools, will be a more general recognition of their great economic value. To those who know and love birds and all nature, this is, it is true, by no means the greatest consideration; nevertheless, it is undeniably one which appeals strongly to the popular mind.

One of the first questions which an appeal for the more general protection of birds will provoke, is almost certain to be: "Well: what good are they anyway?" If we can suppress an expression of pity for the benighted condition of the questioner, we can produce an array of facts generally sufficient to convince the most sceptical, that the vast majority of birds are well deserving of our great efforts to encourage and protect them. A familiar example is the Meadow Lark. As far as known, the food of this bird consists entirely of insects, including many such as wire-worms, cutworms and grasshoppers, which are distinctly injurious to growing crops.

The Meadow Lark occasionally winters in the province (though, for what reason, it is hard to imagine), and from an examination of the stomach contents of several specimens taken in the winter, it has been found that, even under stress of weather, they had not resorted to vegetable diet, but had succeeded in unearthing various grubs and beetles. The Meadow Lark is thus in everyway a decidedly beneficial bird in the agricultural districts where it makes its summer home ; yet, in spite of this and of the beauty of its plumage and of its clear ringing whistle, it not only receives no protection at the hands of the farmer whom it befriends, but, in many cases, either the birds themselves or their eggs or young are wantonly destroyed. A very slight knowledge of the habits of the birds would do a great deal towards preventing their destruction.

In connection with the recognition of the economic value of birds, a little study will do a great deal towards clearing up many false ideas concerning hawks and owls, which are usually subject to the most relentless persecution. A little study will show that while some hawks, like the Goshawk and Sharp-shinned Hawk, and some owls, like the Great Horned Owl and the Snowy Owl, are injurious ; nevertheless, the great majority of them are, not only not injurious, but even decidedly beneficial. A careful observation of the habits of the living bird by competent observers and an examination of the contents of thousands of stomachs afford the only satisfactory test of its economic value. In the case of hawks and owls, these methods have been carefully applied and go to show that most of them are of great ecomomic value.

The value of these birds lies in the destruction by them of very large numbers of mice, rats, squirrels, gophers, and other destructive vermin. A good illustration of the value of such an owl as the Long-eared Owl, is afforded by an examination of the pellets which collect beneath the roosting places. As nearly every one knows, an owl swallows its prey whole, and the indigestible portions, such as fur and bones, become matted into pellets and are disgorged through the mouth. In the case of a roost occupied by a Long-eared Owl for some weeks during November and December, 1902, about one hundred and fifty pellets were found. These pellets were about the size of a small mouse and contained on the average about two skulls each, with other bones and fur. The number of skulls shows that during that time the owl had destroyed about three hundred mice.

It is probable that nearly all owls and hawks will take birds if they can get them ; but, that they habitually do so, is sufficiently disproved by the above mentioned methods of observation. Another good result which would follow a more general study of birds, would be a lessening of the wanton destruction of their nests and eggs. The habit of egg collecting was formerly very prevalent and is still sufficiently common to be a serious factor in the destruction of birds. It is unfortunate that many of our most valuable insectivorous and song birds are those which, from their habit of nesting near towns and in accessible places, are particularly liable to this form of persecution. The eggs of Bluebirds, Yellow Warblers, Goldfinches, Catbirds, Phœbes, Kingbirds, Woodpeckers, Swallows, and in fact of all those birds which are most valuable and worthy of protection, still find their way in large numbers to the pockets and other receptacles of the ubiquitous small boy. It should be the duty of every teacher to do what he can to prevent this. It is not sufficient alone to point out that it is against the law and punishable by fine or imprisonment, because, in order to make such a law effective, it is necessary to create a popular sentiment in its favor. Probably the most effective way to create such a sentiment is to call attention to the economic value of birds.

Aside from these very practical considerations, however, the study of birds has an educational value which is probably not exceeded by that of any other department of Nature Study. It should be borne in mind that the object of such studies is not the acquisition of technical knowledge ; but, as Dr. Fletcher has pointed out, " to train the mind " and to aid the learner to become " self-dependent." That is indeed a valuable system of education which, while accomplishing these important ends in the best possible way, also brings the student into close, even intimate, contact with his natural surroundings. If we " in the love of Nature hold communion with her visible forms," we have an unfailing source of interest and recreation which is of priceless value to those possessing it.

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MY PET CROWS.

L. H. SMITH, Strathroy, Ont.

The first bird pet I ever owned was a member of the Crow family, a Jackdaw. This bird is a smaller species of Crow, and makes a most interesting pet. Of course my pet's name was Jack, and, when poor Jack died, as all pets do (and generally tragically), it nearly broke my heart. It was in my boyhood's days, in the old land, and I can see now the mournful procession of children in Jack's funeral cortege, all crying out of sympathy for each other, and also for me, who was Jack's master. What a sad day poor Jack's funeral was to me !

Of the many pets I have had in this country, none are so funny, so cunning, and so interesting, as our common Crow.

On a fine day in early June, 1901, with a friend I started out to hunt a crow's nest. We had a long tramp, and were not successful until we came upon two boys, and, on putting the question to them " Did they know of a crow's nest ? " Yes, they knew of one, with five young ones in it, but there were five boys interested in it, and each boy wanted a crow. " Well, show me where the nest is, that I may see how large the young ones are ; and, if they are ready to take, I will make some arrangement with you to let me have them." They took us to the nest ; one of the boys climbed the tree and held up one of the young birds, and I saw that it was nicely feathered and just the right age to take to rear. " Now, boys, what will you take for your crows ? " Oh, they would each take ten cents. I expected a higher demand, so closed at once, and ordered the boy who was in the tree to bring down all the crows in his handkerchief, which he did " Now, boys, who besides yourselves are in the partnership in this crow's nest ? " They named three others, and I said " Here is your 10c. each for your crows; tell the other boys to come to my house and get ten cents each for theirs; or let each take his crow, just as he pleases." This was, I thought, fair dealing, and, as I had bought out two shares, I felt sure of two pets, which was really all I needed.

When I arrived home with my birds, which I carried in my handkerchief, my wife asked me: "What in the world are you going to do with five crows?" "Oh," I said, "they do not all belong to me, there are some boys who have an interest in them, and I guess will soon be after them." And I was not mistaken, for when it became known to the Crows' Nest Company that I had taken the crows, the stockholders were soon after me. For several days after I got the crows, when my wife saw boys coming to the house, she would say: "I guess it's some more of your crow boys."

One boy took his crow, the others I paid off as they came along, ten or fifteen cents, just as I could make the bargain. I did not keep a Crow debit and credit account, so do not remember how many shares I bought out; but, when congratulating myself that I held all the stock, a boy came along; he proved to be one of the original shareholders that I had bought out. He said his brother "owned one of the crows," and, as he was sick in bed and unable to come, he had sent him (the speaker) as his representative to demand ten cents, which I duly handed over; though I never inquired whether that ten cents ever reached the sick boy.

Crows are omnivorous, are great feeders and easy to raise. I took a box about ten inches square and four inches deep; in this I made a nest of soft hay, in which the birds, when young, and before they were able to perch, would sit; and, their droppings being ejected outside, like from their natural nest, they were kept clean and healthy. I fed them largely on milk and bread, with (when the birds were quite young) some hard-boiled eggs mixed in it, raw beef and an occasional worm. Almost anything I would eat myself (no allusion to the worm diet intended), did not come amiss to them, and the quantity of food they consumed, when young and growing, would surprise anyone who never raised young crows. The secret is, Feed little and often.

After settling with all the boys who had an interest in my crows, I had four birds, one of which I gave to a neighbor boy, and was sorry for it afterwards, for he neglected it and it died. One got hurt and came to nothing; but the other two grew to be beautiful sleek birds, and became great pets. They would follow me anywhere and everywhere, and I had to give them the slip in order to be able to get off the premises at any time when I did not want them to go with me. When I went for a stroll or to take my dogs out for a run, they always went along; the distance I went made no difference. They would fly after the dogs, who knew them and would not molest them; return, alight on my hat or shoulder, take another flight, and so on; they as thorougly enjoyed a tramp through the woods and fields with me as my dogs did. I never tried to see how far they would follow, but my rambles would often be a round of several miles.

When wild crows would see them when we were on our rambles, they would sometimes come to them, but my pets did not care for their company, and, when the wild birds saw the tame ones alighting on my hat and frolicking with the dogs, they would fly off. I suppose they were wondering at such uncrowlike behavior on the part of crows. My crows became very friendly with the dogs, would feed with them and steal tid-bits out of their supper-pan, and, when I would play with my dogs by throwing a ball for them to fetch, the crows would fly towards the thrown ball, as the dogs would run, and return to me, as all the dogs would do when one of them had picked up and retrieved the ball. They seemed to enjoy the fun as much as the dogs did. When I was not about the premises, they spent much of their time by the kennel yard in the dogs' company.

These two birds were sleek, handsome fellows, and were very much attached to me, although they always were quite reserved with strangers, whom they never allowed to take any liberties with them, or even touch them, while I could caress them and pet them any way I liked. They would go to sleep resting on my knee, when I would be sitting in the garden, and never appeared to be so happy as when with me. While they were both beautiful birds, so glossy black and healthy as wild birds, still I could notice a slight difference; one was just a little more perfect bird, a little more beautiful specimen than the other, and, had not one died some time before the other, I should have had opportunities of studying the character and individuality of each. They were very fond of a bath, and would dash and splash in the water pan which I always left in the sun for their convenience. When the day was fine and warm, they never missed their bath. They drank slowly, much as chickens do.

A pair of Kingbirds for several seasons have had their nest in my garden, and they used to persecute my crows most shamefully. They would fly after the crows, alight on their backs, and peck at them. It was some time before I could satisfy myself that the kingbird actually rested on the crow's back when attacking him: his (the kingbird's) wings would always be extended and elevated, and fluttering to enable him to keep his balance; but I felt sure that his feet were always on the crow's shoulders when he attacked the latter. The kingbirds were the only creatures around my premises of whom my crows were afraid, and they certainly lived in bodily fear of them.

One morning I found one of my crows lying near the barn wall, quite dead. I have no doubt he flew against the barn in terror trying to escape from the kingbirds. I was very sorry, as I was now left with only one pet; he missed his companion, and kept my company and that of the dogs, more than ever. I felt sorry for him in his loneliness.

In September I went to Manitoba. I was away a month. Almost the first thing I asked for on my return, was my crow. My people had only bad news to tell me of him: he had been going away a good deal, and on one or two occasions had stayed away for two days or more; he seemed, in fact, to have lost regard for them and love for his home, etc. I went into the garden and called him; he flew straight to me and alighted on my shoulder. He commenced pecking, in a bibbling way, at my ear, and chattering all the while; the bird was overflowing with joy to see me, and stayed by me and with me the rest of the day.

A pet crow I had the year before was very fond of having his head scratched, which operation I used to perform with my finger. My wife used a small piece of chip or stick for the purpose, being afraid of bird-lice creeping on her. He would follow her until she picked up a chip, when he would hold his head in position to be scratched. On one occasion he carried a chip to her, which of course she took and used for the purpose indicated.

As a bird student, I will not say what can be taken out of these two episodes. Evidently, my pet was delighted to see me back after a month's absence, though what he said to me, crows alone could tell. The bird which carried the chip, might have done so with the intention of getting his head scratched with it, and he might not. We cannot get at what the birds know and what they think.

There is one objection to keeping pets, it is that they nearly always meet with an accidental, and often a tragic death. One morning in winter I called my bird to his breakfast, and he failed to respond. I never saw him after. He used to roost in the trees by the house, and I blamed the big brown owl for robbing me of the most lovable pet I ever had, and thus adding another to his long list of murders.

John Burroughs, in the "Atlantic Monthly" for March, 1903, in a paper on "Real and Sham Natural History," handles Seton Thompson and Rev. William J. Long without gloves. He ridicules some of the stories in Thompson's "Wild Animals I have known," and calls the writer of "School of the Woods" "Our Natural History Munchausen." I am not prepared to take sides. I think there are stories in "Wild Animals I have Known" which had better have been omitted or written differently. Long says a partridge can count eleven; Burroughs scouts the assertion. Who is to decide?

I might have drawn on my imagination, and said much more about my pet crows than I have done.

There is a mystery surrounding animal life which we cannot read, cannot interpret and cannot understand. I think, though, that one can get a little nearer the soul of a wild animal by making a pet of it.

WINTER GROWTH OF A WATER LILY.

WALTER S. ODELL.

When I uncovered my aquariam in my yard to-day (30th March, 1903), the water at one end was not frozen, the other end was covered with ice varying from thin to three inches thick at the farthest end. I was surprised to find that a Water Lily, *Nymphæa chromatella*, had two partly grown leaves, one smaller leaf and four curled up leaves ready to unfold, and two flower buds, on the surface of the water, while just underneath was a leaf curled up, not so far advanced in growth. One bud was badly decayed; the other was small and rose above the surface of the water about one and one-half inches.

With this plant are several other water lilies, also Nelumbiums, *Calla palustris*, *Cabomba*, &c. Last autumn the leaves of all these showed natural decay, except the *Nymphæa odorata rosea*, which had six or eight very large vigorous cordate leaves mottled with dull red, and a nearly mature flower bud, at the surface of the water. This spring all these large leaves and their stems had decayed and disappeared, while in their stead were the young leaves and bud before mentioned. The *C. palustris* started a shoot three inches above the water before being frozen in the surface ice, but had no growth when covered last fall. No other plant life was visible there.

The aquarium, measuring inside 14 in. x 7 in. x 2 ft., was filled with water to the brim late last fall before frost; a layer of boards was placed over it, then tar paper with overlapping edges; about a foot of wet manure was placed on this, while for a roof over all, slanting boards covered with tar paper to keep off all rain completed the shelter. When uncovered this spring, the manure was frozen to the boards and possibly had frozen solid. Where the ice was thickest the top boards were about four feet above the water.

It seems strange that the *N. odorata rosea* should grow and have natural-colored leaves in the dark, during winter, instead of the pale light yellow leaves one would naturally expect to find on plants growing away from sunlight; or that a plant should grow at all with ice on the surface of the water. No water lilies start in the Rideau River where the water is shallow and consequently warmer, till vegetation is well advanced on land everywhere.

REPORT OF THE ENTOMOLOGICAL BRANCH, 1902.

(Read at meeting of Club held Feb. 10th, 1903.)

The entomologists of the Club although few in number have been actively engaged during the past season, and a fair number of captures rewarded their efforts. Valuable work has been done in breeding and working out life-histories of Lepidoptera. The most successful collector has been Mr. C. H. Young, who has added several species of nocturnal Lepidoptera to the local list. His collections have been made at Hurdman's Bridge, near his residence, and at Meech Lake, P.Q., in the Laurentian Hills. Mr. Arthur Gibson has continued his studies on the Tiger Moths of the genus *Apantesis*, and has made some interesting discoveries, the results of which will soon appear in print. Dr. Fletcher and Mr. Gibson have reared from eggs several species of insects, the eggs of which have been received from correspondents, or collected in the Rocky Mountains. Among these, perhaps the most interesting are *Erebia Disa* (eggs from Mr. N. B. Sanson) and *Nemeophila petrosa*, from Banff in the Rocky Mountains ; *Nemeophila Selwyni* and *Argynnis triclaris* from Nepigon ; *Antarctia rufula*, from eggs received from Mr. J. W. Cockle, of Kaslo, B.C. Mr. Young also has been successful in rearing local species from the egg and has added many fine series of specimens to his collection of inflated larvæ.

Mr. A. E. Richard has made an important addition to the local butterflies in the interesting little satyrid *Cænonympha inornata*.

Mr. Harrington has devoted much time to Diptera and has added many to previous records of the flies found at Ottawa.

In addition to the work done by the entomologists at the Club general excursions, many sub-excursions were held during the summer, and regular meetings of the Branch are being held during this winter, where short papers are read and free discussion takes place on all matters connected with this branch of research. Much good has resulted from these reunions in stirring up enthusiasm and in helping the members to settle points of identification which are troublesome when students are working alone At one of these meetings, we were favored with a visit from Mr. J. D. Evans, of

Trenton. The orders which have received most attention in the past are the Lepidoptera, the Coleoptera, the Hymenoptera, the Diptera, the Hemiptera, and the Odonata. The leaders would be glad to see more work done in the Odonata and the Orthoptera, insects of much economic importance, the former from their predaceous habits of feeding on other insects, particularly mosquitoes, and the latter from the injuries they do to crops.

Mention may be made ot the following captures during the past year—nearly all of which are additions to the Ottawa lists.

LEPIDOPTERA—

Cœnonympha inornata, Edw. Near the Rifle Range, June 14. (Mr. A. E. Richard.) The same insect is reported by our Montreal member, Mr. H. H Lyman, as having been taken near Montreal by some of the members of the Montreal Natural History Society.

Pieris rapæ, L., var. *nov-angliæ*, Scudder. This is the rare yellow variety of the Common White Cabbage Butterfly. (A. Gibson.)

Feralia major, Smith. April 20. (Fletcher.)

Hepialus mustelinus, Pack. (Gibson, Young.)

Chytonix sensilis, Grt. Meech Lake, Q. (Young.)

Semiophora youngii, Smith. Mer Bleue. Sept. 18. (Young, Gibson.

Agrotis genicula, G. and R. June 9. Meech Lake. (Young.)
Noctua jucunda, Walk. July 26 " "
" *rubifera*, Grt. July 25. " "
Porosagrotis mimallonis, Grt. Sept. 3. " "
Carneades fumalis, Grt. Sept. 3. " "
" *velleripennis*, Grt. Aug. 25. " "
Hadena nigrior, Sm. June 14. " "
" *cariosa*, Grt. July 16. " "
" *algens*, Sm. Sept. 12. " "
Hydrœcia inquæsita, G. and R. Sept. 8. Ottawa. (Young.)
" *cerussata*, Grt. Sept. 8. Ottawa. (Young, Fletcher.)

Macronoctua onusta, Grt. Sept. 29. (Fletcher.) This has also been taken at Montreal by Mr. Winn, and at Belleville by Mr. Evans.

Tæniocampa oviduca, Grt. May 26. Meech Lake. (Young.)
" *culea*, Gn. May 31. " "

Scopelosoma devia, Grt. April 22. (Young.)
Xylina fagira, Morr. April 16. (Young.)
" *ferrealis*, Grt. Sept. (Gibson.)
Pseudolimacodes littera, Gn. June. (Gibson, Young.)

In addition to the above, it may be mentioned that the Birch trees in this vicinity were again this year much defoliated by the Birch-leaf Skeletonizer (*Bucculatrix canadensisella*, Cham.) and that columbines in gardens were considerably disfigured by the unusual numbers of the caterpillars of the skipper butterfly *Nisoniades lucilius*, Lint.

HYMENOPTERA—

The Hymenoptera of Ottawa, as compared with these insects in other parts of Canada, are comparatively well worked up; but there is much work in this very important order, waiting to be done by some specialists. Mr. Harrington has large and valuable collections in most of the sub-orders and is constantly naming material from all parts of Canada. The same may be said concerning the Diptera and the Hemiptera.

The following Hymenoptera are worthy of mention here:—

Spilomena pusilla, Say. A small wasp, new to the Ottawa list. (Harrington.)

Metopius pollinctorius, Say. (Harrington.)

Anoplonyx canadensis, Hrgtn. A new species described from Ottawa. (Harrington.)

Taxonus nigrisoma, Nort. The larva rather injurious from its habit of boring into apples to pupate. (Fletcher.)

COLEOPTERA—

Xyloryctes satyrus, Fab. (Fletcher, Harrington.)
Bellamira scalaris, Say. " "
Anthophylax attenuatus, Hald. Chelsea. (Fletcher.)
" *malachiticus*, Hald. " "
Pselaphus Erichsonii, Lec. (Harrington.)

JAMES FLETCHER,
W. H. HARRINGTON.
ARTHUR GIBSON.
C. H. YOUNG.

SUB-EXCURSION.

A sub-excursion of the Ottawa Field-Naturalists' Club was held on Saturday, June 20th. It was the first fine day for over a week. The few who took part in this outing, enjoyed it very much. The meeting-place was at Victoria Park; but it was some minutes after three before a sufficient number of members were assembled. As there were so few present, it was decided to have no after-speeches; and we were soon divided into groups, botanical, entomological, etc. One of the first specimens to attract the attention of the botanical group was the Wood Nettle. And not far off from it was seen growing the natural antidote to its sting, the Bitter Dock. In the same rich damp soil were found several other interesting specimens: the Fringed Bindweed with its racemes of white flowers and the minute cilia at its joints, the Honewort with its irregular umbellets of tiny white flowers, the creeping Hog Pea-nut, hardly yet in flower; but we wander on, seeking for rarer species. Many a treasure of earlier excursions is now passed by as common, or is scarcely recognized, now that it is seed-bearing, such as the Mitrewort and False Mitrewort, the Jack-in-the-pulpit, the Star-flower, the Painted Trillium, and several species of Violet, and of the more common Crowfoots.

We cross some open fields and see some of the agricultural weeds: the Common Milkweed with its drooping umbels of sweet-scented purple flowers, the Common Gromwell, which is recognizable all through the winter by its ivory-white sessile nutlets, the Common Hound's-tongue, with its barbed nutlets, by which it is so often carried away unconsciously by man and by beast. Then there are some prettier weeds, such as the Ox-eye Daisy and the Tall Buttercup. But the weeds are too numerous to be all recorded, and we pass on. "We may find some interesting specimens by that stream," says our leader. And, true enough, each of us adds to his collection something interesting. There are two Bedstraws, the Rough and the Sweet-scented; in the marsh is the Bur-weed, a close relative of the common Cat-tail; the Common Elder, which flowers rather later than the red-berried one, was there with its flat cymes of a heavy sweet scent. The

Sweet Viburnum was there in berry. Farther on, we found its cousin, the Arrow-wood, with its maple-like leaves.

But the greatest reward of our search was yet to find. It was not the occasional specimens of the Wild Strawberry, which were not preserved for later examination, nor the small prickly fruit of *Ribes Cynosbati*, which we willingly left to some children to gather, only warning them that the fruit was still green, nor the Hazelnut with its long cylindrical beak. No. The most valued prize gathered that afternoon was a plant of no known use at all, a leafless parasite. But this plant was rare. It was unknown to all of us. It had a single flower on its naked scape ; but it was a pretty flower, of pale purple colour with some yellow marking in the throat. Several specimens were found in the immediate neighbourhood, and each of us were able to take away one or more. Afterwards we learned that it is the One-flowered Cancer-root [*Aphyllon* (*Thalesia*) *uniflorum*], of the Broom-rape family.

Another very interesting botanical find was the Partridgeberry in flower. This pretty little trailing vine, with its evergreen leaves variegated with whitish lines and its scarlet berries, may be found both in autumn and spring time, but it is only for a comparatively short season in June that it remains in flower.

A much commoner flower, but beautiful with its rosy markings, is the Spreading Dogbane. It grows abundantly along the borders of thickets. Its numerous, tiny, rose-coloured flowers make it an attractive object as it grows. But its milky juice is not pleasant on one's hands, nor does it revive so readily in a vase as those plants do whose juice is more watery.

However, time flies by, and so we bring our excursion to a close. There is left many another interesting specimen to be gathered, or to be studied, from trees, shrubs and herbs. And next time may there be many other enthusiastic naturalists to join with us in these pleasant Saturday afternoon excursions !

E. BLACKADER.

ORNITHOLOGY.

HERRING GULL'S EGGS.

On the 7th June of this season I collected on a small rocky island in Trout Lake, in the Parry Sound District, two eggs of the American Heron Gull (*Larus argentatus Smithsonianus*, Coues. The nest was composed of moss, pine needles, small sticks, wild hay, and lichen : its contents being these two eggs, which when blown were found to be fresh. Their ground colour is brown gray with greenish cast, one being somewhat lighter than the other ; and they are spotted and blotched with light purplish gray and sepia. They measure respectfully $2\frac{1}{16}$ ins. x $1\frac{7}{8}$ ins. and $2\frac{3}{4}$ x $1\frac{7}{8}$ ins.

ANDREW HALKETT.

A SELF-HEALING WOUND.

I once shot a wild pigeon that previously had had its breast pierced through and through by a shot, and on each side the wound was covered as if by a neatly applied gum and down plaster as symetrically round as the hole itself and not quite as large as a 25 cents piece. Those plasters could be scraped off only by the use of a knife, and when removed they left to the view, on both sides, a healthy looking and rapidly healing, though still open, wound.

EMERY PERRIN.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of this important society is to be held in Ottawa on Sept. 3rd and 4th next, and is to be followed by a field day on Saturday 5th The meetings are all open to the public, and the members of the Ottawa Field Naturalists' Club are specially invited to be present, to contribute papers and to take part in the discussions. The day meetings will be held in the Board of Trade room, 46 Elgin st., and the evening meeting on Thursday, in the large assembly hall of the Normal School. At this latter meeting Prof. W. Lochhead, of Guelph, will deliver his inaugural address "The Progress of Entomology in Ontario," and Dr. L. O. Howard, U. S. Entomologist, of Washington, will give an address on "The Transmission of Yellow Fever by Mosquitoes."

NATURE STUDY—No. V.

SUMMER COURSE AT NORWAY BEACH.

A. E. ATWOOD, M.A.

Norway Beach Park is situated on Norway Bay, an arm of the Ottawa, about forty miles up the river from the capital. During the past two summers, short courses of recreative nature study have been given at the Beach. This sketch is intended as an informal record of a few features of the free-and-easy two weeks' course during last July.

The work was characterized by earnestness without seriousness ; it was scientific without being technical ; it was practical, yet not exacting. The true, the beautiful, and the good constituted a guiding trinity. Any truth that illustrated the unity of nature, any beauty of form and especially beauty of adaptation that revealed itself, and Nature's lavish bounty in the endless variety of her gifts to man, were emphasized whenever an instance occurred.

With the object of leading the students to appreciate scientific nomenclature, they were asked to submit from time to time specimens of plants whose popular names are misleading. The response to this request is indicated by the following list, in which the unscientific part of each name is italicized : sweet *fern*, reindeer *moss*, prince's *pine*, club *moss*, *Canada* thistle, mountain *ash*, and evening *primrose*. In this connection it is surely pardonable to remark that knot *grass* is not grass.

The boys and girls who attended, were requested to remember the scientific name when easy and etymologically suitable. In a review a boy was asked to name the genus to which the clovers belong. There was no reply. "Try," prompted a clergyman encouragingly. "*Trifolium*," was the immediate response.

"Do you know the classical name for the maple ?" "Ay, sir." "Give it please." "*Acer.*'

In his opening address the leader expressed the opinion that it would be possible to find five species of maple in the locality and he offered to compete with the rest of the school in finding them. One young woman submitted a spray of the Maple-leaved Viburnum Her attention was directed to its fruit, and thus she was convinced of her error, but even the youngest member of the class felt the appropriateness of its name,—*Viburnum acerifolium.*

A few days later the Purple-flowering Raspberry was the subject under examination. After two or three other brambles had been named, the students were told that all belonged to the genus *Rubus.* They were then asked to propose a suitable specific name for the plant under immediate consideration, and *Rubus acerifolius* was at once suggested—a more satisfactory name perhaps than *Rubus odoratus*, by which it is known to botanists.

Attention was then called to the fact that the fruit of the Raspberry consists of an aggregation of drupelets, each of which is itself a perfect fruit,—*more than one fruit from one flower.* The fruit of the Partridge-berry (*Mitchella*) has on its surface two depressions the significance of which was discovered by a bright boy who suggested that each pit was the place where a flower had been,—*one fruit from more than one flower.*

Another problem was to interpret the significance of the fleshy teeth of the fruit of the Creeping Wintergreen (*Gaultheria*). After the capsule had been dissected out, it was made clear that these teeth were the lobes of the enlarged calyx. The leader then asked the students to name a fruit cultivated for the sake of its fleshy calyx and was surprised to have a little girl give the apple as an example. On being questioned as to the source of her information, she said that Mr. Macfarlane had the year before called the attention of the students to the fact. She had not forgotten it though twelve months had elapsed.

Another instance of the lasting impressions made by the nature study method of teaching was furnished by a girl of twelve who was asked to tell how a tree should be planted. She described minutely the method illustrated a year ago by Mr. W. T. Macoun, who gave a practical demonstration by planting a little pine tree in the auditorium during the course of his lecture.

There was also a sequel to Mr. R. B. Whyte's talk of last year on the shrubs of Norway Beach, when the characteristics of Poison-ivy were specially emphasized. Some time after, two young men of that locality were picking stones in a field when they came to a heap over which trailed Virginia Creeper. One of them said, "Rather than run the risk of being poisoned, we will leave those stones there." "This is not Poison-ivy," said the other, as he seized the shrub and drew it to one side, "I attended Norway Beach summer school, where I learned that this is Virginia Creeper, for each leaf has five leaflets, not three as Poison-ivy."

As mosquitoes were a feature in the environment, they also received a little scientific attention. The malaria-inoculating genus (*Anopheles*) was described, and the students were asked to bring specimens on the day following. The shaded wings and pointed pose of the body when the insect is at rest, betray the *Anopheles*, whose long palpi, if closely examined, furnish a corroborative means of identification. It is rather difficult to kill a mosquito without injuring it as a specimen ; indeed, the writer spent half an hour that evening in the attempt to do so. At last one was secured, and he proceeded to examine it with a magnifying glass. So life-like was the corpse that a little boy who saw it, exclaimed : "There's a mosquito!" and immediately crushed the dearly-bought insect between his finger and thumb.

Someone has said, "Punctuality is the thief of time." In order that those who arrived at the auditorium punctually, should not have their time wasted, an opportunity was given them of examining objects under a microscope while the tardy ones were on the way. On one occasion a drop of blood was required, to obtain which, all the mosquitoes present were invited to "bite." As none took advantage of the invitation (and certainly mosquitoes have reason to be suspicious of scientific inquirers), a little girl volunteered to shed her blood in the cause of science. She did so by opening a recent wound on one of her bare feet. The blood corpuscles were soon revealed, and the students present realized how small the microbe of malaria must be when they had been informed that a colony may develop within one corpuscle.

While due emphasis was given to the fact that botanical classification is based on the structure of the flower, the leader encouraged the student to give attention to relationship as revealed in other organs. For instance, after the Prince's-pine (*Chimaphila*) had been made a subject of analysis, the class was asked to bring other plant species which they might reasonably expect to belong to the same family. Trailing Arbutus, Bearberry, Creeping Wintergreen and Pyrola were submitted, their low-growing habit and leathery leaves being the characters of similarity.

In like manner, members of the Grass Family were to be identified by the two-ranked leaves whose sheaths are split on the side of the stem opposite the blade. From this character, wheat and oats were recognized as grasses. The former was named as that member of the Grass Family that contributes most food for man. A question as to the staple food of the people of China and of India led the class to see that the pre-eminence belongs to rice. The leader had to tell them that rice is a grass, as none had ever seen it growing. In Nature Study our great aim is to walk by sight, not by faith; but it is often necessary and quite allowable to get information second-hand, especially when it is based on intelligent first-hand knowledge. We thus learn from the researches of others that the Grass Family stands first and Pulse Family second in the amount of food contributed to man. It was left as an undecided question as to the order of plants that has the third place, but the member of the class who was regarded as the oracle, declared that either the Rosaceæ or Solanaceæ occupy this grade.

The centre of interest of the Pulse Family was the nodules that are found on the roots of the different species. In one particular most plants resemble Coleridge's Ancient Mariner who was perishing with thirst though there was "Water, water, everywhere." Plants grow in an ocean of nitrogen, which element they require for their proper development. Though there is, in the atmosphere, nitrogen, nitrogen everywhere, the plants are unable to assimilate it in the free state. Now the tubercles on the roots of leguminous plants are the homes of minute organisms called Rhizobia, which are free-nitrogen-assimilating bacteria, and by whose instrumentality these plants are able to incorporate the necessary nitrogen A pedagogical moral to be drawn from the foregoing, is that teachers of plant study should encourage their pupils to dig for their information,—to examine the root as well as the stem and the leaves.

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NOTES ON SOME CANADIAN SPECIMENS OF "*LITUITES UNDATUS.*"

J. F. WHITEAVES.

One of the rarer fossils of the Black River limestone in the Province of Quebec, is a spirally coiled cephalopodous shell that was identified with *Lituites undatus* by E. Billings many years ago, and that certainly corresponds very well with one of the specimens that Professor James Hall has figured under that name. Specimens of this fossil, collected at the Falls of the St. Charles River at Lorette, also on the Lac Ouareau River, north of Joliette, by Sir W. E. Logan in 1852, and three miles west of Napierville, south of Montreal, are still labelled with that name in the Museum of the Geological Survey. Most of these specimens are not more than two inches in their greatest diameter.

But it has long been suspected that Hall has unintentionally included more than one species under the name *Lituites undatus*, and it is obvious, from his figures, that none of these are referable to Breyn's genus *Lituites*, as now understood.

The following is a brief summary of the literature bearing on this question :—

1842. On page 394 of the "Report of the Geology of the Second District of New York", by Dr. Ebenezer Emmons, two fossils are rather roughly figured under the name *Inachus undatus*. There is no detailed description of this species, and all that is said of it is that "this remarkable fossil is found at Watertown in the black limestone. It is rare. Casts sometimes occur which are smooth."

1847. In the first volume of the Palæontology of New York, Hall described some specimens from the same locality, which he evidently believed to be conspecific with Emmons' species. under the name *Lituites undatus*, and figures four of them on Plates XIII and XIII *bis*. Hall, however, quotes *Inachus undatus* as a manuscript name of Conrad's, who was then the State Palæontologist, and states that "this fossil is known to me only as occurring at Watertown, Jefferson County, in the Black-river (or '*seven foot tier*' of) limestone, being unknown in any higher position."

1857. About this date a few specimens from the Black River limestone at Lorette and other localities in the Province of Quebec, were identified with *Lituites undatus* by E. Billings. In this year Professor E. J. Chapman expressed the opinion that these and other specimens of *L. undatus* should be referred to the genus *Cryptoceras*, d'Orbigny, but it has since been shown that this name is preoccupied.

1863. In the Geology of Canada, page 156, *Lituites undatus* is recorded as occurring in the Black River limestone on the St. Charles River, at St. Ambroise, four miles north of Lorette.

1883. Professor A. Hyatt, in his "Genera of Fossil Brachiopoda" published in the twenty-second volume of Proceedings of the Boston Society of Natural History, refers all the specimens that Hall figured as *L. undatus* to Conrad's genus *Trocholites*, but has since abandoned this conclusion. The siphuncle of *Trocholites*, it may be mentioned, is either central or near the dorsum. In this paper, also, Hyatt proposes and briefly characterizes the genus *Plectoceras*.

1884. Professor Gustav Lindström, in his memoir on the Silurian Gastropoda and Pteropoda of Gotland, says that the generic name *Inachus* Hisinger (1838) cannot be used for a mollusk, as it is pre-occupied in Crustacea, and that it "consisted of three species, of which one, *I. sulcatus*, is a *Pleurotomaria*, *I. angulatus* is an *Oriostoma*, and *I. costatus* a cephalopodous shell, probably a *Trochoceras*."

1891. Dr. A. H. Foord, in the second part of his "Catalogue of the Fossil Cephalopoda in the British Museum," claims that Hall has figured more than one species under the name *Lituites undatus*, and describes one of these as *Trochoceras Halli*. The types of Dr. Foord's species are two apparently rather small specimens, that do not show the shape or position of the siphuncle, from the Black River limestone at Lorette ; but these are stated to be the same as the specimen of *L. undatus* figured by Hall on Plate XIII, figs. 1 and 1*a* (cæt. excl.) of the first volume of the Palæontology of New York.

1894. Hyatt, in his "Phylogeny of an Acquired Characteristic," published in the thirty-second volume of the Proceedings of the American Philosophical Society, refers all the specimens that Hall figures as *Lituites undatus* to Schroeder's genus *Eurystomites*, but says that "there are several species usually placed under the name *Lituites undatus*." He makes no mention of Foord's *Trochoceras Halli* in this connection, but gives the name *Plectoceras obscurum* to a supposed new species, which he does not figure, and of which all that he says is that it "occurs in the Black River fauna in New York and is quite com-

> monly mistaken for the young of *Eurystomites undatus;* but it has an open gyroceran spiral, the siphuncle is nearer the venter, and the costæ are more highly developed and more prominent, and have a distinct character from those of that species."

In 1878, Mr. T. C. Weston visited Lorette, on behalf of the Geological Survey, and succeeded in obtaining for its Museum a fine series of large and unusually well preserved specimens, that agree very well with Foord's description and figures of *Trochoceras Halli*, but that give some additional information in regard to that species. Some of these specimens, which measure a little more than three inches in their maximum diameter, are apparently adult shells, with the apertural margin well preserved. Their coiling shows only a slight and scarcely trochoceran inflection, and is almost if not quite gyroceraconic. The lip of each of the presumably full grown specimens is thin, simple, and parallel to the obliquely flexuous ribs, or narrow rib-like plications, and minute ridges, that cross the outer whorl obliquely, and is consequently curved convexly forward on each side, and both deeply and concavely backward on the venter, which is broader than the dorsum. The sutural lines are nearly straight, and the siphuncle is cylindrical, ventral and marginal.

The resemblance between these specimens from Lorette and the *Nautilus Jason* of Billings, the type of Hyatt's genus *Plectoceras*, is very striking, and the close resemblance of similar specimens from Lorette, etc., to *N. Jason*, had not escaped Mr. Billings' notice. Indeed the only practical difference between these species would seem to be that the volutions of *N. Jason* are a little more losely coiled than those of *Trochoceras Halli*, and that the siphuncle of the former is placed at a short distance from the periphery or venter. In the present state of our knowledge of this question, the writer is inclined to think (1) that no specimens that exactly correspond with the *Inachus undatus* of Emmons have yet been found in the Province of Quebec ; (2) that all the specimens from the Black River limestone of that province that have been referred to *Lituites undatus* are *Trochoceras Halli* ; and (3) that the last named species is a *Plectoceras* and should therefore be called *Plectoceras Halli.*

It may, however, be stated that, in a letter dated August 4th, 1898, Professor Hyatt expressed the following opinion in regard to *Trochoceras Halli:* "Foord's species is clearly in my opinion a species of *Sphyradoceras*, in which I now include also my genera *Peismoceras* and *Systrophoceras*. This genus and *Plectoceras* are now close allies and appear together in my MS. of the article Cephalopoda in Eastman's translation of Zittel's Text-book of Palæontology, under the family name Plectoceratidæ. What you say about the siphuncle being ventrad of center, etc., if your specimens are also heavily annulated from a comparatively early stage and trochoceran in form, or even if comparatively symmetrical, seems to me to place them better in in *Sphyradoceras*." Yet, in the printed text of that article, which embodies Hyatt's latest views on the Cephalopoda, *Plectoceras* is said to be Ordovician, Silurian and gyroceraconic, and *Sphyradoceras* Silurian, Devonian and "almost exclusively torticonic of the trochoceran type."

If *Trochoceras Halli* is a *Plectoceras*, there are at least two Canadian species of that genus, whose synonymy is as follows :

PLECTOCERAS JASON (Billings).

Nautilus Jason, Billings. 1859. Canad Nat. and Geol., vol. iv, p. 464.

Plectoceras Jason, Hyatt. 1883. Proc. Boston Soc. Nat. Hist., vol. xxii, p. 268; and (1894) Proc. Amer. Philos. Soc., vol. xxxii, p. 498.

Types : three specimens in the Museum of the Geological Survey of Canada, that were collected by Sir W. E. Logan and James Richardson in 1856, from the "Chazy limestone" (not the Calciferous, as stated by Hyatt) of the Mingan Islands.

PLECTOCERAS HALLI (Foord).

Lituites undatus, Hall, pars. 1847. Palæont. N. York, vol. i, pl. XIII, figs. 1*a* and 1*b* (cæt. excl.).

Trochoceras Halli, Foord. 1861. Cat. Foss. Cephal. Brit. Mus., pt. ii, p. 41, and p. 42, figs. 4 *a*, *b*.

Types : two specimens in the British Museum, from the Black River limestone at Lorette. Similar specimens in the Museum of the Survey are from Lorette and other localities in the Province of Quebec, as previously stated, and Mr. Walter R. Billings has found a specimen that seems to be referable to this species in rocks of the same age near Ottawa city.

The brief description of *P. obscurum*, Hyatt, unaccompanied as it is with any illustration, is insufficient to show whether it is synonymous with *P. Foordi* or distinct therefrom.

In the Black River limestone of Ontario and Quebec there are two other species of cephalopoda that may belong to the genus *Plectoceras*, though the few specimens that have yet been found of each do not give any indications of the shape or position of the sipuncle.

One of these is a large specimen from Kingston, Ont., and its immediate vicinity, of which the writer has seen three specimens. Two of these are still in the Museum of Queen's University, and the other has recently been acquired, by exchange, from the authorities of that institution, for the Museum of the Geological Survey. All three, upon the whole, agree very well with Emmons' two figures of *Inachus undatus*, and with Hall's representations of *Lituites undatus* on Plate XIII, fig. 1, and Plate XIII *bis* of the first volume of the Palæontology of New York. But the writer has not seen any Canadian fossil that exactly corresponds with the original of Plate XIII, fig. 3, of that publication, in which the siphuncle is represented as placed at a short distance from the venter, as in *P. Jason*. The two specimens in the Museum at Queen's show only traces of the surface markings, and the sutural line of one of them is curved concavely and shallowly backward on the side preserved, and not parallel to the obscure plicæ. The specimen now in the Ottawa Museum is a cast of the interior of the septate portion of the shell, five inches and a half in its maximum diameter, with fragments of the test attached. Its outer volution is subquadrate in transverse section, and the surtural lines are nearly straight on the sides but shallowly concave on the venter or periphery. It is doubtful whether these specimens should be called *Eurystomites undatus* (Emmons) as suggested by Hyatt, or *Plectoceras undatum* (Emmons).

The other is the *Gyroceras* (*Lituites*) *vagrans* of Billings (1857) from La Petite Chaudière Rapids, near Ottawa city, and near Mile End, Montreal. Of this species the writer has only seen two specimens, both from La Petite Chaudière. The more perfect of these is the type of the species, a very imperfect and badly preserved specimen, in the Museum of the Geological Survey. As Mr. Billings says of this specimen, it exhibits only "an artificial polished section passing through the central plane of the whorls, shewing clearly the construction of the tube to the apex, where it has a diameter of only one line ; some of the septa and almost one-half of the transverse section ; but neither the siphuncle, the character of the surface, nor the length of the produced oral extremity is indicated."

The attention of collectors in Kingston and Ottawa is called to these two very imperfectly defined species, in the hope that a renewed and diligent search at these localities would result in the discovery of specimens that are sufficiently perfect to establish their position among modern genera, and to more fully elucidate their specific characters.

Ottawa, Sept. 21st, 1903.

A ROBIN STORY.

EMERY PERRIN, Ottawa.

One early morning in the first week of June last, as I was standing at my bed-room window, facing the garden, I perceived a male robin which was literary dancing on top of the fence, while chirping loud without interruption.

On opening the window, I knew by the bird's antics and shrill voice that something was wrong, possibly with it's mate, and that the brave fellow was actually *calling for help.*

I hastened down to the garden, and the moment the robin saw me it redoubled it's efforts to attract my attention, flying to and fro and from me to the fence, as if to indicate that the trouble was on the other side of it. At which I concluded that some prowling cat must be in the very act of devouring the robin's mate or one of it's young.

But no, there was no devouring being done yet. Only a big tom-cat was crouching on a pile of old lumber and watching from that point of vantage a poor female robin that was hanging by a piece of twine fastened to its broken leg from a heavy lopped-off plum-tree branch lying on the ground between pile and fence. The cat appeared to be puzzled, on the one hand, by the whirling of the captive bird, and somewhat intimidated, on the other hand, by the frantic appeals and plucky showing of the male robin.

All this I saw in the twinkling of an eye

Jumping over the fence, I took hold of the captive bird with my right hand and of the rather cumbersome branch with the left, and tried to cut the twine with my teeth, as I had no knife with me at the time ; but in this I was unsuccessful. So, retracing my steps over the fence with bird, branch and all, I reached my shed, where I knew there was a pair of scissors, with which, on second thought, I severed, not the twine, but the mere shred of skin that still held together the dislocated leg of the bird, and so released the latter.

After a few gentle strokes of the hand upon its back, I let the now crippled robin take its flight. It alighted first on the ground in the garden, and remained there for a few minutes, regaining it's wind and strength. Then it perched itself on one of the plum-trees

After relating the above facts to my people at the breakfast table, my sister and I repaired to the garden, where to our utter amazement and delight we beheld the crippled robin bathing it's stump in a pail (which I had previously filled with water) by *sitting* on the brim of the pail and lowering itself so as to reach the refreshing liquid. And that it did repeatedly in our presence, when we were but a few feet away from it

Finally my sister wanted to capture the poor thing, so as to nurse it's amputated limb, and she made a move in that direction, but the wounded robin flew away with it's male companion who had been around all the time, giving vent to it's fear by repeated notes of anguish, and it was not seen any more.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Fortieth Annual Meeting of the Entomological Society of Ontario was held in Ottawa, on Thursday, Friday and Saturday, the 3rd, 4th and 5th Sept., 1903. Among those present were Prof. W. Lochhead, Ontario Agricultural College, Guelph, President of the Society; J. D. Evans, Vice-President, Trenton; W. E. Saunders, London, Secretary; Dr. L. O. Howard, U. S. Entomologist, Washington, D.C.; Rev. Dr. Bethune, London; H. H. Lyman, A. F. Winn, C. Stevenson, G. A. Moore, and A. E. Norris, Montreal; J. B. Williams, Toronto; Dr. James Fletcher, Arthur Gibson, C. H. Young, W. H. Harrington, Dr. Blackadar, Dr. C. Guillet, T. J. McLaughlin, and other residents of Ottawa.

On Thursday morning a meeting of the Council was held, and during the afternoon, beginning at 2.30, the reports of the Council, District Directors, Delegate to the Royal Society, and of the Montreal, Toronto and Quebec Branches of the Society, were presented. The reports of the Directors dealt chiefly with outbreaks of injurious insects in the different Districts represented, while those from the Branches reviewed the work carried on during the year.

The first paper on the programme was one by Rev. Dr. Bethune, of London, Ont., "A menace to the Shade trees of London, Ont." This made mention of the presence, particularly on maple trees, of millions of the Cottony Maple Scale. These insects occurred in great numbers along the lower sides of the branches, resembling large woolly deposits on the trees, being very unsightly and at the same time injurious. Mr. H. H. Lyman, of Montreal, read a paper "Two Remarkable Aberrations (Lepidoptera)," in which he recorded the capture in Montreal of a most beautiful form of *Spilosoma virginica*, which was clearly and definitely banded with black, as in *Colias philodice*, and one of *Melitæa phaeton*, which lacked the white spots above. A paper "Additions to Quebec Syrphidæ," by Mr. Gus. Chagnon, was presented, and gave interesting new records of the collection in that province of flies belonging to this family.

On Thursday evening in the Assembly Hall of the Normal School, the President, Prof. W. Lochhead, delivered his inaugural address, "The Progress of Entomology in Ontario." This was a practical address, very suitable to the occasion, and contained much useful information as to the important part which had been played by the Entomological Society in developing economic entomology in Canada. He divided the history of the Society into three periods, referring to the excellent work which had been performed during these periods by some of the prominent workers whose names were now so well known in connection with the Society.

Following Prof. Lochhead's address, Dr. L. O. Howard, U. S. Entomologist, gave a succinct statement as to the Transmission of Malaria and Yellow Fever by Mosquitoes. This presentation of a subject which is now acknowledged to be one of the greatest discoveries of the latter end of the last century, was treated in such a plain and delightful manner by the eminent lecturer, that it is no exaggeration to say that the whole audience sat spellbound during the half hour, which seemed to be only a few minutes, so keen was the attention. After these two speeches another half hour was taken up with answering the many questions bearing on the latter subject, which were asked by many of those present. It is greatly to be regretted that so few of the medical profession were in attendance. Knowing the intense interest of this subject to them and its bearing on the well being of the country at large, every doctor in Ottawa had been specially and individually asked to be present.

On Friday morning the Society met early, and many valuable papers were read and discussed. Dr. Howard spoke of "Recent Work in American Economic Entomology," and gave an account of the excellent work on the Cotton Boll Weevil which had been performed by the officers of his department, and pointed out the large saving in actual money which could be made in similar cases by the application of definite scientific knowledge.

"Insects Injurious to Crops in Ontario in 1903" were dealt with, together with the remedies which had been found most effective in saving loss, by Prof. Lochhead, of Guelph, and Dr. James Fletcher, of Ottawa. Prof. Lochhead also read a paper on "The Present Status of the San José Scale Question in Ontario," and showed plainly how serious a matter the presence of this insect in the Ontario orchard of the Niagara and St. Catharines Districts really was. Insects Injurious to the Basswood tree, were treated by Mr. Arthur Gibson, of Ottawa.

On Friday afternoon further papers were presented. Dr. Fletcher read a draft of the Entomological Record for 1903, pointing out the advantage to working entomologists ot this record and urging that the different families of insects should be treated of by specialists. Dr. Fletcher also read "Notes on the Life histories of two rare Manitoban Moths, *Apocheima rachelæ* and *Leucobrephos middendorfi*," the eggs of both of which had been received from Mr. Norman Criddle, of Aweme, Man Rev. Dr. Bethune read a note on the occurrence of the beautiful Leopard Moth, *Ecpantheria scribonia*, at London, Ont., a larva of this species having been found by him and sent to Ottawa, where the moth was reared. Mr. Arthur Gibson read "Further Notes on the Larvææ of Canadian Tiger Moths, of the Genus *Apantesis*." Three cases showing the moths and inflated larvæ in various stages, were exhibited in illustration of this paper and were very much admired by all present at the meeting. "Notes of the Season in Western Quebec," were given by Mr. Charles Stevenson, of Montreal.

Specimens of remarkable and rare insects were exhibited during the meeting by the members present. An interesting feature of the meetings was the discussion ot each paper as it was delivered. Every meeting was open to the public, and it is surprising that so few members of our Club availed themselves of the opportunity of learning something about beneficial and injurious insects. Through the kindness of the Ottawa Board of Trade, the day meetings were held in their commodious and very comfortable room on Elgin street.

On Saturday morning a visit was made to the Division of Entomology at the Central Experimental Farm, where a very pleasant hour or two was spent in examining the collections under the guidance of the Entomologist and his assistants. At 12 o'clock the visitors were driven all around the Farm, and at 1 o'clock were entertained by Miss Dorothy Fletcher, to an *al fresco* lunch in the Botanic Garden. The afternoon was spent by such members as could remain, in an excursion to Dow's Swamp and the Rideau River. Dr. Fletcher who accompanied the party pointed out localities of special interest, and although, owing to the weather, few specimens were secured, everyone was well satisfied with the outing.

FIRST AUTUMN SUB-EXCURSION.

A most successful sub-excursion—the first held this autumn—took place on Saturday afternoon, September 26th. About 50 members and friends of the Club, including many of the Normal School students, left the pavilion at Rockcliffe under the guidance of the President, Mr. W. T. Macoun, and spent a most delightful afternoon in the woods around Rockliffe, Mackay's Lake and Beechwood. The weather was perfect for such an expedition. The beauty of the autumn woods called forth many appreciative exclamations of wonder, and one pair of hands could hardly hold the many treasures gathered by every member of the party. The company very soon broke up into three groups, one going with Dr. Ami to study the fossils near the river. The main body followed the President along the eastern shore of Mackay's Lake, where they studied the trees and shrubs, of which there is there great variety. A smaller party went with Mr. Attwood, Dr. Whiteaves and Dr. Fletcher around the western shore. Afterwards both parties joined in the woods near Beechwood. Here short addresses were delivered by the President and Dr. Fletcher. Special attention was directed to forest trees, berries and other fruits. The distribution of plants was illustrated by the various kinds of burs, of which a large and representative collection was available on the clothes of the excursionists. Some rare ferns were collected and exhibited such as *Pellæa gracilis*, the Rock Brake, *Asplenium angustifolium*, and *Aspidium Goldianum*. Simple characters were given by which the different families of ferns could be recognized. The greatest rarity found was the curious Peloria state of the Common Toad-flax, *Linaria vulgaris*. Violets, which have been so carefully studied in this locality, also came in for some attention, and the inconspicuous cleistogamous flowers and autumn fruits of several species were shown, including *Viola Dicksonii* with its underground fruit, and pods which had been formed underground and had then pushed their way to the surface two or three inches from the main stem. The automatic distribution of the seeds of violets by the contraction of the strong valves of the pods was explained. The autumn flowers of the Canada Violet were much admired. The hibernation of insects came in for some attention, the caterpillar of the Isabella Moth serving as an illustration. The gay caterpillar of *Cucullia asteroides* was found on *Aster cordifolius*.

BOOK NOTICE

BOTANY—THE ARTIFICIAL CULTIVATION OF TRUFFLES.

Boulanger, M. Emile. Germination de l'Ascospore de la Truffe: 4to, pp. 20, 20 plates, Paris, France, 1903.

Until quite recently, as may be seen in books of botany, the early stages of the Truffles were unknown. This, however, owing to the skill and careful work of the author of the above pamphlet, is no longer the case. Mr. Boulanger has recently given us the results of his patient scientific studies on the germination of the spores of two species of edible truffles, and there is no doubt that, before long, developments of great economic importance in the cultivation of these fungi may be the outcome of his studies. One of the species used by Mr. Boulanger in his investigations is the Black-spored Truffle (*Tuber melanosporum*), which is the truffle most highly valued by epicures; the other the Hook-bearing Truffle (*T. uncinatum*), although also edible, is less esteemed.

The author in 1898 first obtained the germination of the spores in sterilized water, and from these, on slices of cooked carrots sunk in the earth, he grew the mycelium or spawn. This was afterwards produced on the earth itself and on other media; then, finally, from the mycelium he succeeded in growing fully developed truffles in his laboratory. These, it is true, lacked the characteristic taste and smell which give truffles their gastronomic value; and, moreover, they were misshapen; but, nevertheless, they were true adult perithecia of *Tuber uncinatum* containing normal asci.

The next step was to try the practical cultivation of the fungi in the open air under the conditions in which truffles grow in nature. This was done in 1900 on seven acres of an old oak forest at Etampes, near Paris; pieces of raw carrot impregnated with the spawn were buried at the base of oak trees and a special fertilizer (6 per cent. potasium sulphate and 6 per cent. superphosphate of lime) applied on the surface of the soil. On the 7th May, 1903, specimens of truffles of the second crop from these cultures were exhibited by Mr. Boulanger at the meeting of the Mycological Society of France. These specimens grown under natural conditions out of doors, it may be remarked, had the fully developed aroma and taste of commercial truffles, although, as stated above, those grown in the laboratory from similar stock did not develope those important characteristics.

Two fine plates accompany the pamphlet and show the spores in the different stages of germination This work is an important contribution both to science and horticulture. J. A. G.

NATURE STUDY—No. VI.

NATURE-STUDY WITH ADVANCED CLASSES—AN EXPERIMENT.

Prof. W. LOCHHEAD, Guelph, Ont.

Bailey has said: "When the teacher thinks chiefly of his subject, he teaches a science; when he thinks chiefly of his pupil, he is probably teaching Nature Study." This sentence puts in a nut-shell the proper *attitude* of the teacher of Nature-Study, but it should also be the attitude of every teacher who claims to *educate*, no matter whether he is dealing with pupils in the public schools, or with students in the colleges and universities. It must be admitted that the framers of the courses, and the teachers as well, in most of our colleges, lay too great stress on the subject-matter, and leave out, to a large degree, the student. Of all colleges, an agricultural college should be the best school for the study of Nature,—and for Nature-Study as well, if there is a real distinction; for from the outset the attention of the student is directed towards the soil, the plant, and the animal; yet, it must be confessed that the method of instruction in some of these colleges is still ' largely a reflection of mediæval practices and ideals."

For some time past the writer felt that the studies of the regular session dealt too much with laboratory collections and with books, and too little with out-of-door subjects. He felt also that the student should acquire the "habit of observing and seeing for himself and at his best, without books or help, in the presence of the facts and in the open air." It is true that the in-door method of investigation is an adaptation to meet unfavorable conditions. The regular session of the Ontario Agricultural College does not begin until the middle of September; winter sets in about the first week of November; and the session closes on the 15th of April. There is therefore little opportunity for thorough out-of-door studies during the regular session.

To remedy this state of affairs, a two months' course in Nature-Study was given at the College, for the first time this year to the students of the Third Year. This course began on the 20th of April, and continued until the 15th of June.

As the students were already familiar with the elementary facts of botany, physics, entomology, and zoology, the method of instruction was of course different from that usually adopted in our Public and Normal schools. The instructors gave no set of lectures ; they acted as guides, and suggestors of lines of investigation. The topics assigned to each student for investigation related as far as possible to matters of economic importance to the agriculturist ; for it was believed that such investigations would carry out the dual purpose of Nature-Study, which is : first, to "developе an attitude—a power of interpretation and appreciation of nature, a power of self-expression which will enable the student to gain a better control of himself and his surroundings, to live a fuller life, and to be of greater service to society than he otherwise would be" ; and, second, to gain that intimate knowledge of nature which will make men better able to cope with their living environment, or, in other words, for its economic usefulness.

From the very outset, the subjects assigned to each student could be studied best at that particular season ; for the writer believed strongly that Nature-Study should be taken up from a seasonal standpoint. Every student had to show the results of his studies in careful drawings and well-kept notes. For the first two weeks all the students took the same work, but for the remainder of the term individual work was the rule. Classes were formed for the study of birds every morning, and besides, excursions were made to the museum. Excursions took place also for the study of the structure and habits of the forest trees, the spring plants, the life of ponds and streams, and the common insects of the orchard ; as well as the study of the different soils of the Farm, and the rocks of the neighborhood.

Particular attention was given to the study of the winter buds and twigs of our common shrubs and trees. Keys were made for the determination of the common shrubs and trees on the College campus by means of their winter buds.

Following were some of the topics assigned : Recognition of trees and shrubs by the winter twigs and buds ; the story of an apple twig ; a study of the fruit-spurs of our common orchard trees and shrubs ; a study of trees, from a distance and at close range ; a study of germinating seeds ; a study of the wood of dicotyledonous trees ; a study of the wood of coniferous trees ; recognition of grasses by their leaves ; studies of the sundew ; studies of the rosaceous family ; the development of the apple and cherry; studies of the heavens at night ; the story of the dandelion ; the development of the frog ; the life-history of mosquitoes ; studies of snails and slugs ; the habits of the common birds (about 60 were identified during the term) ; studies of the currant-worm ; development of barberry and wheat rust ; lady-birds ; a soil survey of the Farm ; the grasses of Guelph ; insects and plants ; etc.

Throughout the whole course every student was compelled to record daily in the "Nature-Study Journal" some observation which he had made during the day. This Journal was carefully inspected every day by an instructor, in order to determine the accuracy of the descriptions of the observations made by the students. As the term wore on, the observations were given in greater detail.

For the first two weeks of the term the class met for an hour every day at two o'clock. At first the time was devoted mainly to explaining the written instructions given out to the students, and to encouraging the observers. Later, however, two of the students were selected every day to report the results of any investigation which they had concluded. The object of this was to give them facility in expressing their ideas before an audience.

It is likely that some of the students who took this Nature-Study course at the Agricultural College will sooner or later become teachers of Agriculture, and perhaps Nature-Study, in either the Public or High schools of this province In the writer's judgement, the knowledge of plants, animals, earth, and sky is absolutely necessary to the teacher who essays to teach Nature-Study. It appears to be of greater importance than the knowledge of the psychology of the child. It is probable that the teacher, who is himself a nature student, has gained through his own experience an insight into the best way of interesting the child, such as he could never obtain in any other way. A teacher may have a knowledge of child-nature, but if he has not a knowledge of nature as a part of his environment, it will be next to impossible for him to maintain for any length of time, in a direction which will be educative, the child's natural interest in its surroundings. How can a teacher train the child to use the materials of knowledge, such as plants and animals, in the proper development of the phases of its being, if that teacher himself cannot use the materials of its knowledge?

That this Nature-Study course was a success, was the verdict of the whole class. Although it ran into the holidays of the student, who usually places a high value on his holidays, yet every member of the class considered that the time had been well spent, and that they had got a glimpse into nature that will ever remain as a refreshing picture. Most of the students were the product of our Public and High school system, and had to a certain extent lost their independence. They had been spoon-fed too much, and were practically unable to investigate and verify facts for themselves. This Nature-Study course delivered them from this bondage; it made them investigators and have opinions of their own. To the writer the work seems of great value, not only for the information the students obtained at first hand, but for the attitude which it developed and the point of view obtained. The writer was not teaching botany, entomology, and geology; he was teaching plants, insects and fields.

The Nature-Study course will be given again next spring; and, if it proves satisfactory, will become a permanent feature of the Third Year.

As advocates of Nature-Study we all have one common object in view. Human as we are, our methods will be as varied as our minds, and methods are not the be-all and the end-all of education. With some of us, our methods may lead some authorities to believe that we are furnishing information chiefly; with others, methods may be over-done, too much attention being given to the cultivation of the Nature-Study *attitude*, and too little to the useful side. There is a happy medium, but only the very best teachers can hope to attain to that stage of perfection. It is clear, nevertheless, that, whatever mistakes may be made at the outset as to methods in the introduction of Nature-Study, "the essence of it," in the words of Bailey, "can never pass away, because it is fundamental to the best living."

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THE LOWER JAW OF DRYPTOSAURUS INCRASSATUS (COPE).*

LAWRENCE M. LAMBE, F.G.S., F.R.S.C., of the Geological Survey of Canada.

(With three plates.)

The following remarks on the lower jaw of *Dryptosaurus incrassatus* are the partial result of the examination of the remains of two skulls of that species in the collection of the Geological Survey of Canada, and are offered in advance of a more detailed description of the specimens in course of preparation by the writer at the present time.

The two skulls are from the Edmonton series** of the Cretaceous system of the North-West Territory, and were collected by Mr. J. B. Tyrrell and Mr. T. C. Weston in 1884 and 1889 respectively. The first specimen, figure 1, was obtained two miles from the mouth of Knee Hills creek, a tributary of Red Deer river, in the District of Alberta. The second, figure 2, was found on the east bank of Red Deer river, about twenty-one miles above the mouth of Knee Hills creek.

A preliminary description of these specimens by Professor E. D. Cope appeared, in 1892, in the Proceedings of the American Philosophical Society.***

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* Communicated by permission of the Acting Director of the Geological Survey of Canada.

** Regarded by Tyrrell as comprising the uppermost beds of the Cretaceous system in Alberta. Geological and Natural History Survey of Canada, Annual Report, new series, vol. II, part E, 1886.

*** "On the skull of the Dinosaurian Lælaps incrassatus, Cope." Proc Amer. Philos. Soc., vol. XXX, p. 240.

The skull discovered in 1884, figure 1, is somewhat larger than the one found in 1889, figure 2. In both, the right ramus of the mandible is displaced downward so as to reveal its inner surface. In the 1884 specimen both halves of the mandible are preserved almost in their entirety, The left ramus lies against the lower left half of the cranium so as to conceal its inner surface in the vicinity of the anterior half of the surangular, and the corresponding part of the right ramus is hidden by some of the bones of the palate. In both rami, unfortunately, a considerable part of the lower border is missing below the front part of the surangular. The 1889 specimen consists of the anterior parts of the skull, the lower jaw lying against the palate so that the inner surface of the left ramus and the outer side of the right one is hidden. The left ramus is preserved for about three-fourths of its entire length from the front but the right ramus is broken off at about its mid-length.

In comparing the mandible of *Dryptosaurus incrassatus* with that of the Jurassic *Ceratosaurus nasicornis* of Marsh, it is seen, that the former is deeper, in proportion to its length, than the latter, otherwise the general contour in both species is somewhat similar.

In the Canadian specimens the following elements of the lower jaw are more or less clearly exhibited :—the dentary, the surangular, the angular, the articular and the splenial, with a presplenial. The coronoid is in both specimens either not preserved or is covered by other bones of the skull.

The dentary is a large and robust bone extending backward to beneath the articular cotylus. Its greatest depth is attained at about its mid-length, where it meets the surangular and narrowing rapidly passes backward below that element, overlapping it posteriorly as a thin plate terminating in an acute point, figure 3. On the inner surface the dentary occupies about one-half of the lower depth of the jaw anteriorly, narrowing backward gradually until it passes to the outer surface. In the amount of its backward extension it equals that of the dentary of *Sphenodon* as described by Günther in the Philosophical Transactions of the Royal Society of London in 1868.*

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* "Contribution to the Anatomy of Hatteria (Rhynchocephalus, Owen)." Philos. Trans. Royal Soc., vol. 157, p. 595, pl. xxvi, fig. 7.

The surangular is broadly arched above, as seen in side view, and almost completes the remainder of the outer surface of the mandible, the posterior end of the angular being visible inferiorly to a limited extent. The surangular is strengthened exteriorly, near its upper border, by a prominent rounded ridge extending for some distance forward from the articular cotylus into the composition of which this bone enters. It embraces the articular anteriorly and passing beneath it extends as far back as the posterior limit of that element. It is pierced by a large foraminal opening at about one-fourth its length in advance of its back termination and at about its mid-depth; its inner surface in this region is deeply concave (figure 4). Below the foramen the bone becomes gradually thinner, where it is overlapped by the dentary, and is continued forward with a thickness inferiorly of only a few millimetres, although posteriorly and along its upper border it is a strong and robust bone.

The articular is small and compact, roughly triangular in shape, and is scarcely seen except when viewed from above. It forms about two-thirds of the cotylus and is overlapped on its inner side by the angular, which extends nearly as far back as either the surangular or the articular. Its breadth exceeds its antero-posterior diameter.

The cotylus is transverse, strongly bifossate and evidently points to a strictly upward and downward motion of the jaw, as the distal end of the quadrate fits closely into it. The movement of the jaw is, therefore, apparently restricted, and differs from that of *Sphenodon* in which the articulating surface is nearly four times as great antero-posteriorly as the condyle of the quadrate and admitted of a backward motion of the mandible.

The slender bone meeting the surangular below the articular, and embracing the latter element on its inner surface, is regarded as the angular. It passes forward on the inner surface of the ramus in contact with the inferior edge of the posterior extension of the dentary but is, unfortunately, broken in both rami of the 1884 specimen at a point slightly behind the mid-length of the surangular. The break in both halves of the jaw at this point is unfortunate as it is here that the junction of the angular with the splenial would have been looked for. It is probable, however, that anteriorly the angular increases considerably in depth reaching the coronoid above and the splenial in front.

The broad lamellar bone immediately above the dentary on the inner surface of the ramus (figure 2) is the splenial. It is misplaced in the specimen figured in plate I, and it is seen in section in its proper position in both skulls at the points *e* and *f* in figures 1 and 2 respectively. It is perforated near its anterior end and close to its lower border by a large oval foramen. At a short distance behind this foramen a well marked emargination of the bone occurs, visible in both specimens but shewing more decidedly and to a greater extent in the skull figured in plate I. The outline of this emargination bears a strong resemblance to the anterior end of a second foraminal opening, which if it did exist, may have been partly formed by the angular as in *Crocodilus*.

Continuing forward from the splenial is a narrow presplenial that a[illegible]ently reaches to, or almost to, the front limit of the dentary.

Above the presplenial the inner alveolar plate of the dentary, of about the same depth as the presplenial, forms the inner wall of the dental chamber and completes the inner anterior surface of the ramus. It meets the splenial posteriorly and narrows rapidly upward, but its relation to the dentary and the splenial, behind the dental series, has not been ascertained. Its upper border is at a lower level than the outer alveolar border of the dentary.

In *Megalosaurus* the bony partitions dividing the alveoli from each other are described* as springing from the inner alveolar wall and projecting outward to the inner surface of the outer wall. The reverse of this seems to be the case in *Dryptosaurus*, in which the principal alveolar grooves are apparently formed on the inner surface of the outer dentary wall with little or no development of grooves in the alveolar plate. In this particular the alveoli of *Dryptosaurus* are somewhat similar in general plan of structure to those of the dental chamber of the mandible of the Cretaceous species of *Trachodon** (and possibly also of the genera *Monoclonius* and *Triceratops* and their allies), in which the teeth move upward in well defined grooves in the inner surface of the outer wall of the dental chamber, whilst the surface of the inner wall of the chamber is comparatively even and smooth. The partitions between the alveoli in *Dryptosaurus* seem to form part of, and to be continuations or extensions of, the inner surface of the outer dentary wall inward toward the dentary plate with which they are apparently not connected. In the left ramus of the specimen shewn in figure 1, the crowns of all the teeth except the twelfth are broken off close to the alveolar border leaving sections of their bases exposed at this level, so that the exact position of the teeth is definitely determined. In the right ramus of the same specimen, however, seven of the teeth (seen only in the right aspect of the specimen) are preserved intact. In the specimen figured in plate II fourteen teeth of the left ramus are preserved, whilst in advance of the anterior full-sized tooth a small tooth partially protudes at a lower level. This tooth is apparently an additional one in the series and not a successional tooth, making the total number, in the complete dental series, fifteen. It is truncated posteriorly so as to be similar in shape to some of the teeth described by Leidy, under the name *Deinodon horridus*,** as being peculiar in form, and to a tooth referred to by the writer in his description of *Ornithomimus altus**** as being from the anterior portion of the jaw. No successional teeth have been observed in either of the specimens of *Dryptosaurus* from the Edmonton series. The teeth of this species (without reference to such as may be considered to be incisors) are carinated on their anterior and posterior edges, the carinations being minutely serrated, with about ten to twelve denticulations in a space of 5 mm. They are lenticular in section above (figure 7), but in passing downward a flattening of the anterior and posterior borders takes place and becomes more pronounced near the base of the crown, a slight flattening of the sides of the teeth also becoming more decided in the lower portion of the crown. The anterior carina passes gradually to the inner side of the crown whilst the posterior one is well over toward the outer side for the greater part of its length. The posterior keel extends downward for the whole length of the crown but the anterior one stops at about one-fourth the height of the crown from its base.

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* "Notice on the Megalosaurus or great Fossil Lizard of Stonesfield," by the Rev. William Buckland. Trans. Geol. Soc., London, second series, vol. 1, p. 395, pls. XL and XLI, 1824; and "On the Skull of Megalosaurus," by Professor Owen. Quart. Jour. Geol. Soc., London, vol. XXXIX, p. 339, pl. XI, 1883.

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* Contributions to Canadian Palæontology, vol. III (Quarto), part II, "On Vertebrata of the Mid-Cretaceous of the North West Territory," by Henry Fairfield Osborn and Lawrence M. Lambe, pp. 73 and 78. 1902.

** Trans. Amer. Philos. Soc. Extinct Vertebrata from the Judith River and Great Lignite Formations of Nebraska, by Joseph Leidy. 1860, p. 144, plate 9, figs. 37-40.

*** Contributions to Canadian Palæontology. 1902, pp. 53, pl. XIV.

The anterior part of the external surface of the dentary of the smaller specimen is rough, and exhibits a number of small foramina, near its lower front margin, with others in a line at some distance below and parallel to the alveolar border. In the larger specimen a few openings of corresponding size are also apparent near the anterior lower border of the dentary but the general surface of the bone is smoother. In this specimen also a somewhat obscure row of shallow depressions extends upward and backward in an oblique curve (above *e* in figure 1) across the dentary at about its mid-length. This feature is suggested in the dentary of the smaller specimen, but it is too indistinct to be spoken of with certainty. The front portion of the surangular is striated as shewn in figure 1.

MEASUREMENTS.

Of larger specimen, collected in 1884 (plate I).

	MM.
Extreme length of left ramus of mandible	970
Greatest depth of same (approx.)................................	227
Length of dentary	905
Depth of dentary at its mid-length, at *a*, figure 1 (approx.).....	185
Thickness of ramus at mid-height anteriorly, at *b*, figure 1A	52
Length of surangular above..........................	490
Thickness of surangular through the ridge near its upper border, at *c*, figure 1	33
Thickness of surangular above the ridge, at *c*........................	23
,, ,, below ,, ,, ...	14
Height of surangular foramen	38
Width of posterior portion of angular near its distal end, figure 4	50
Width of same at *g*, figure 4......	30
Thickness of same at *g*..	23
Transverse diameter of articular cotylus	112
Thickness of ramus from upper surface of cotylus, at its mid-length, to lower surface of dentary	42

Combined thickness of dentary and surangular at *h*, figure 3	10
Length of crown of fifth tooth of right ramus	54
Breadth of base of crown of same	28
Thickness of „ „	18

Of smaller specimen, collected in 1889 (plate II).

Length of dentary, above, to its junction with the surangular	380
Depth of dentary at its junction with the surangular	160
Length of angular foramen	50
Length of crown of sixth tooth	38
Breadth of crown of same at base	18
Length of crown of seventh tooth	55
Breadth of crown of same at base	21
Length of crown of eighth tooth	46
Breadth of crown of same at base	21
Length of splenial foramen	52

EXPLANATION OF PLATES OF FIGURES ILLUSTRATING THE MANDIBLE OF *Dryptosaurus incrassatus* (COPE).

PLATE I.

Figure 1. Mandible of the larger of the two specimens, as seen from the left; two-fifteenths, or slightly more than one-eighth, the natural size.

Figure 1A. Section of left ramus of same, through the sixth tooth from the front; similarly reduced.

PLATE II.

Figure 2. Side view of mandible of specimen collected in 1889; one-sixth natural size.

Figure 3. Exterior aspect of posterior end of left ramus of mandible shewn in plate I; one-fourth natural size.

Figure 4. Interior view of same; similarly reduced.

PLATE III.

Figure 5. Exterior of left ramus.

Figure 6. Interior of the same.

Figure 7. Outlines of transverse sections of a tooth; the upper section is taken at about one-third the height of the crown below its apex; the middle section from a little below the mid-height of the crown; the lowest section from near the base of the crown; in the figures the upper side corresponds with the outer surface of the tooth and the portions on the right to the anterior border of the crown.

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d, dentary; *ang.*, angular; *art.*, articular; *sur.*, surangular; *sp.*, splenial; *psp.*, presplenial; *cor.*, coronoid.

SECOND AUTUMN SUB-EXCURSION.

The second autumn sub-excursion of the Club was made to Blueberry Point, near Aylmer, Que., on Saturday, Oct. 3. Between thirty and forty persons attended. Leaving the city by electric car at 2.20 p.m., the Point was reached shortly before three o'clock. The whole party went at once to the lake shore and there divided, part remaining near the water in order to examine the rocks of the Chazy formation, and to collect shells, many kinds of which were found in a small stream. The other part of the company resorted to the woods to study the trees and herbaceous plants and to search for insects. It was a delightful autumn afternoon, and the woods presented a beautiful appearance. The autumn tints of the maples, sumachs, white ashes, and oaks, were at their very best, and presented a gorgeous spectacle. The Red Maple is the commonest species at Blueberry Point, but the Silver Maple and the Sugar Maple also occur there abundantly. Fine large trees of the Silver Maple growing near the lake offered good subjects for comparison with the Red Maple. Nearly all the different kinds of evergreens which occur near Ottawa, are to be found at this spot, and these also afforded good material for study. Blueberry Point is one of the few places in the Ottawa district where the Banksian or Northern Scrub Pine is found, and quite a number of these trees were seen within two hundred yards of the car track, growing with the White and Red Pines. Among the herbaceous plants of interest found during the afternoon, mention may be made of the Closed Gentian (*Gentiana Andrewsii*) with its large purple flowers, which was collected near the lake shore, together with the Hairy Germander (*Teucrium occidentale*, A. Gray), the Small Scull-cap (*Scutellaria parvula*, Mx.) with its curious seeds, the Yellow Water-Crowfoot (*Ranunculus delphinifolius*, Torr.) in flower and seed, and on the mud near a little stream the Water Starwort (*Callitriche palustris*, L.) was found. Up in the woods beneath the pines, *Viola subviscosa*, Greene, and *V. cardaminefolia*, Greene, rewarded a diligent search. At 4.45 p.m. the party re-assembled, and the specimens collected by the excursionists were examined by the Leaders and named for those who wished to have them identified. The President made a few remarks, congratulating those present on the success of the outing, and invited anyone present who wished for information to ask questions, when they would be answered by the Leaders. In reply to a question, Dr. Fletcher pointed out the botanical differences between the Blue Beech (*Carpinus Caroliniana*, Walt.), and its near relative the Iron-wood or Hop Hornbeam (*Ostrya Virginiana* [Mill.] Willd.). He then referred to some of the specimens collected during the afternoon, and drew attention specially to the Trailing Arbutus, which was shown with its fully formed flower buds, even then ready to expand and give forth their delicious perfume with the first warm breath of next spring. He spoke also of some of the common reptiles, and gave interesting facts about their useful lives, illustrating his remarks at the same time by showing some fine living specimens of Pickering's Tree Toad and the Leopard Frog. While pointing out the beauties of a large specimen of the latter, and the value of his livery of gold, bronze, black, and green for protective purposes, the frog, apparently not relishing the notoriety he was getting, or in an excess of modest confusion when the eyes of about thirty young ladies were directed towards his points of beauty, sprang wildly forth from the demonstrator's hands in an effort to escape. He was, however, soon captured by one of the active young ladies and brought back again to be further studied. When finished with, he was given his liberty, and showed his appreciation by quickly disappearing into the grass. Before closing, Dr. Fletcher spoke of the advantages to be derived from such outings as we were then enjoying, and the special value of our club to all lovers of nature, claiming that it was not organized nor conducted for scientific students only, but provided an easy road with a wide-open door, inviting and encouraging all those who wanted to know more about nature and the common objects about them, to come in and learn more. They would thus become happier men and women, and more useful citizens.

A large proportion of the excursionists consisted of Normal School students, and among others who were present were the First Vice-President, the Secretary and the Treasurer of the Club, and Dr. J. F. Whiteaves, Leader in Conchology, who during the afternoon kindly pointed out many things of interest in the rocks, and also showed what a large variety of fresh-water shells could be collected in a small area by those who knew how to look for them, and Miss Matthews and Miss McQuesten, both members of the Council.

W. T. M.

BOOK NOTICE.

THE ORTHOPTERA OF INDIANA.

By W. S. Blatchley, State Geologist, Indianapolis, Ind., from the 27th Annual Report of the Department of Geology and Natural Resources of Indiana, 1902. 8vo., pp. 348.

We are glad indeed to welcome this last work of Prof. Blatchley's which has just appeared. It is practically a popular manual of the Orthoptera of Indiana and the adjoining States, written in the plainest language, and with full explanations of all necessary technical terms. The author has been very happy in presenting his favorite subject, which he has studied for many years, in a succinct, intelligible manner, a fact which will doubtless render his book a useful manual for many students of this interesting order of insects in other parts of North America. The author has prepared his work for beginners and for others who have no particular knowledge of insects, and, as is not always the case, he begins at the beginning of his subject. In the first chapter, on the external anatomy of a locust, he points out the difference between insects and other animals, and then describes fully the different parts of a locust and their functions. A useful division of this chapter treats of the enemies of locusts, some kinds of which frequently do work of inestimable value in controlling outbreaks of certain species which occasionally become destructively abundant. A plea is made for the protection of some of the birds which do good service in this way, but are seldom recognized as friends, such as hawks, blackbirds, crows, bluejays, bluebirds and prairie chickens.

A bibliography gives the titles of the chief works or papers in which important information regarding the habits and life histories of locusts can be found. Those wishing for fuller information, are referred to Dr. Scudder's Index to North

American Orthoptera, which includes every known reference to each species up to the close of 1900. "A Descriptive Catalogue of the Orthoptera known to occur in Indiana" treats in a systematic manner of every species which has ever been found in the state. Excellent tables enable the student easily to refer a species, first to one of the two large sub-orders Saltatoria or non-Saltatoria, and then to one of the seven families included within these two sub-orders. The former, Saltatoria, embraces the *Acrididæ* or true locusts, the *Locustidæ*, or Long-horned Grass-hoppers and Katydids, and the *Gryllidæ* or Crickets. The non-Saltatoria includes the *Forficulidæ*, or Earwigs, the *Blattidæ*, or Cockroaches, the *Mantidæ* and the *Phasmidæ*, or Stick Insects.

There are no less than 148 species described in this little book in full detail, and among these we find a large proportion of our Canadian Orthoptera. Fourteen species of the number have been described by Prof. Blatchley himself, and six of these are new species described in this work for the first time. A short article treats of "the Life Zones of Indiana," as illustrated by the Orthoptera of the State, and the book concludes with a good glossary of terms and a full index. The illustrations are numerous and good. As a frontispiece, the beautiful coloured plate of the pink variety of *Amblycorphyra oblongifolia* on a head of *Solidago sempervirens* is used. This plate first appeared in "Entomological News" for May, 1901. J. F.

A WEED WORTH GROWING.

(*Matricaria inodora*, L.)

During the autumn of 1902 I had the good fortune to spend a few weeks on that gem of the sea, Prince Edward Island, and was particularly struck with the showy appearance of the above-named Mayweed, which grows as a way-side weed in Summerside and Charlottetown, as well as in many other parts of the Island away from the towns. Thinking, from the size of the flowers, that the plant might be worthy of a trial as a garden flower, I gathered some of the seed and sowed it last spring. On my return to Ottawa in the middle of August, I found a patch of plants 3 feet across and 2 feet high, covered with large flowers, several of them measuring over 2 inches across. From that time till to-day (30th October), the flowers have been produced in profusion and have been much admired by all who have seen them among cut flowers. The foliage is like that of the ordinary Fetid May-weed (*Anthemis Cotula*), being 2-3-pinnately cut up into filiform lobes, of a rich dark green, but without unpleasant odour. This plant is called in England, whence probably it was introduced into Canada, Scentless Camomile or Corn Mayweed. It is an annual and its merits horticulturally are the profusion and continuous production of the showy flowers and the lateness in the season at which they may be found. Geraniums, Phloxes, and even the wild Mayweed, have all now been destroyed by frost, but this Scentless Camomile still holds its head up bravely.

J. FLETCHER.

SOME INTRODUCED PLANTS.

Linaria minor, Desf.—In Macoun's Catalogue, Part II, p. 353, there is a single record of this plant from St. John, N.B. During the past summer I have received specimens from Miss Ada Gardhouse, of Highfield, Ont., and also from Mr. F. J. A. Morris, of Trinity College School, Port Hope, Ont., who writes : "It grows profusely on the Grand Trunk Railway track, for a space of two or three miles east of Port Hope Station, and has been found by me for three years now. It blooms from the 1st of June in daily increasing quantities throughout the summer."

Teucrium Scorodonia, L.—Another introduced plant which has occurred in sufficient abundance to have attracted attention as a possible crop pest is the Germander Sage, which was sent in by Mr. G. Beaudoin, of Ste. Cécile de Whitton, Que., who had found one patch on his land.

SOIREES.—The programme for the winter meetings is now being prepared, and the chairman of the soiree committee (Mr. W. H. Harrington) will be pleased to receive from members of the Club the titles of any papers they may wish to present. When papers are to be illustrated by specimens it will be well to notify the committee of that fact, so that suitable arrangements may be made.

NATURE STUDY—No. VII.

IT IS THE SPIRIT WHICH GIVES IT EFFECT.

G. U. HAY, D. Sc., Editor "Educational Review," St. John, N.B.

So many children leave school at the age of ten or twelve, or even earlier, that it is important to have a well devised plan of nature-study for the elementary schools. Every healthy child is an observer of his surroundings. Before he enters school at all, he is familiar with a great number of material objects, and his questions show that he has thought about them. How important it is then to cultivate this attitude of the child toward his surroundings, lead him to acquire the habits of a naturalist, to find joys, as he grows older, in the country lanes and meadows —joys often denied to those who have superior mental equipment but who have not "eyes to see." Happy are the children who have parents and teachers intelligent, sympathetic and enthusiastic, who will enter with zest into the child's happy world, and will illustrate the lessons in reading and arithmetic, geography, history and drawing, by materials drawn from the child's own environment and resources.

In the charming story of "En Glad Gut" (A Happy Boy) by Björnson, the famous dramatist and novelist of Norway, Öyvind, the hero of the story, is shown at home in the world of nature around him. "His mother came out and sat down by his side. He wanted to hear stories of what was far away. So she told him how once everything could talk : the mountain talked to the stream, and the stream to the river, the river to the sea and the sea to the sky. But then he asked if the sky did not talk to anyone. And the sky talked to the clouds, the clouds to the trees, and the trees to the grass, the grass to the flies, the flies to the animals, the animals to the children, the children to the grown up people ; and so it went on until it had gone round ; and no one could tell where it had begun. Oyvind looked at the mountain, the trees, the sky, and had never really seen them before."

And "the mountain talked to the stream." Now what did the mountain say to the stream, any curious boy or girl will ask ? Did it not say : I have pushed my cool head into the misty clouds, and gathered around it the drops of moisture which give you your joyous life—gurgling over with happiness. And the stream babbles its story to the river,—but let Tennyson's "Brook" or our own Geo. Frederick Scott's "Why Hurry, Little River" tell us that delightful story. And the river moves on with calm and easy motion and gives up—no, it only lends—its waters to the sea. And the sea says: Have I not enough and to spare? I will call up the bright god of day, and this very night when he comes down to bathe and refresh himself in my depths, we will think over a plan to pay back those givers who have poured their tribute without stint into my broad bosom; and the clouds alone shall be let into the secret. And the clouds, blushing all over with joy and pride at the importance of their secret, said: To-morrow morning we will put on our wings and call the winds to help us, and we will fill up the founts of those streams away off on the mountain side, and we will make fresher the green grass and the leaves of the forest. And the leaves in a flutter of delight will whisper the secret to the mossy ground beneath them. And the moss will hoard up the crystal drops in cool retreats of forest and ravine, and yield them slowly to thirsty streams in the parching drought of summer.

And so the stories might be multiplied, and the "fairy tales of science" with their generous substratum of scientific truth might nourish many a boy and girl and give a joy and perennial freshness to their whole lives. And this, I take it, is one of the great objects of nature-study— to develop a habit of mind which only comes by training—the habit of discerning the beautiful as well as the useful in the world, to distinguish the true from the false, to cultivate a reverence for the God that is behind nature and man.

"I hate botany! I hate the study of animals!" I have heard children say more than once. Perhaps we might find a reason if we step into certain school-rooms and see some of the antiquated methods that still prevail in teaching about plants and animals; to study the structure only and the names, and then fling the wilted remains of the plants into the waste-basket; or to make collection of twenty-five or fifty plants of the neighbourhood, mounted and labelled:—all very well if the study of botany does begin and end here. The study of the life of the plant, its habits, how it overcomes obstacles, how and where it thrives best, what it yields, how it takes substances from the earth and air, and converts them into food, these appeal more strongly to the active and enquiring child than making flowers into hay—dry work for a young naturalist. A mounted specimen of a bird, or a limp and lifeless body handed round in a class, may explain some details of structure. But is this all? The happy bounding flight, the joyous song, the services of birds to man, the sacredness of life, kindness to animals—are not these of more importance than structure and names? The lack of intelligent interest in plants and animals on the part of most young persons is due to the way in which the subject is presented to them in school.

Do teachers realize how fascinating it would be for their pupils to measure the distances along the roads which they walk over every day, to know the common wild flowers, trees, birds, and small animals by the wayside? To know the heights of the hills, the length of streams, the areas of fields and lakes near by. To have a portion of the school or home garden to tend and study the conditions of plant growth, along with bird and insect life? To be interested in the little animals that live in the fields and woods, and to have domestic animals to take care of daily? In these and a hundred other pursuits the enthusiastic teacher may lead the way, and stimulate and direct young people to make investigations. The children should be told as little as possible and be encouraged to find out as much as possible for themselves. It is wonderful how much may be accomplished by giving a boy or girl a start.

A friend of mine who is interested in the stars was staying at a house in the country for a week. She taught one of the boys of the family the positions of a few of the constellations, the planets in view, and some double stars; lent him a map of the heavens and a book on astronomy. The boy was an apt pupil, and the summer and winter skies have since been to him and many of his young friends the source of untold interest, opening a new world and sweetening hours of toil.

There is no need that country life should be monotonous. The fall of the leaves in autumn, the winter's sleep of plants under nature's protective garment, the ever-new awakening in spring of bulb and seed and bud, the outburst of joyous song from our genial companions the birds, the insects, transformed and emerging from their concealment, are fresh miracles every season to the lover of God and nature. Every huge boulder rises like an interrogation point from the landscape, every rounded and polished stone carried down by the mountain rivulet, or resting on the shore of the restless ocean, is a page of history unrolled for him who will but read and think. Every forest tree, characteristic in shape, texture and foliage, springing from its tiny seed, has had a history of struggle and triumph over obstacles.

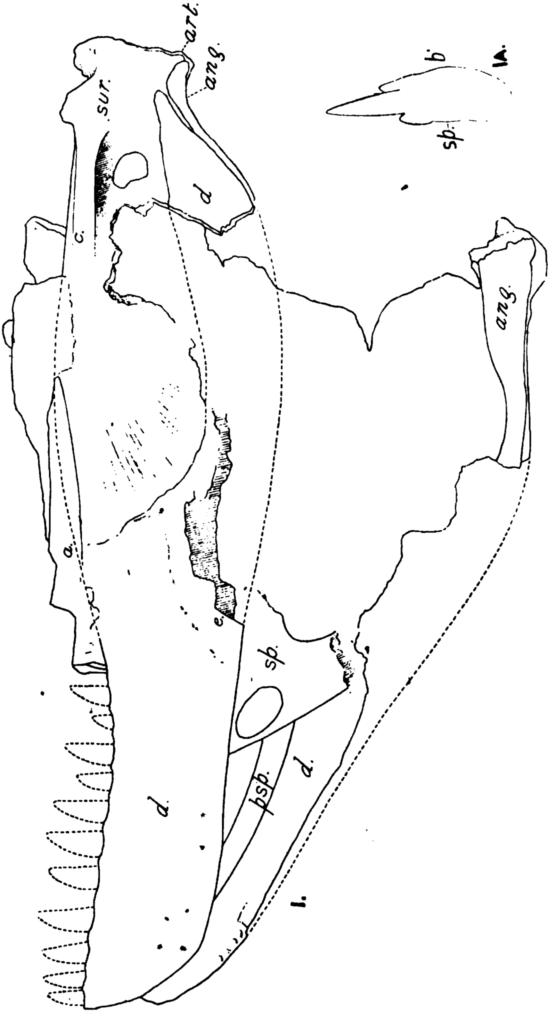
Need I say more? The excellent papers already given in THE OTTAWA NATURALIST have shown in the clearest and most intelligent way how teachers may make use of their opportunities. The thoughtful and earnest teacher, reading these, will be directed to the book of nature which, though it lies ever open, is perpetually sealed to him or her who has not "eyes to see." To the young or inexperienced teacher may I say: The children will be eager to meet you half way. Do not be ashamed to say: "I do not know;" but "let us put our wits together and find out" will be the magical password into nature's secrets and into the heart of the child. If you have any difficulty that you cannot overcome from your own knowledge and from books, you will find the writers of these papers just as willing to help you as they were to write for your benefit. That is the way they would like to pay the debt of gratitude which they owe to the unselfish naturalists who have helped them.

WHAT IS NATURE-STUDY?

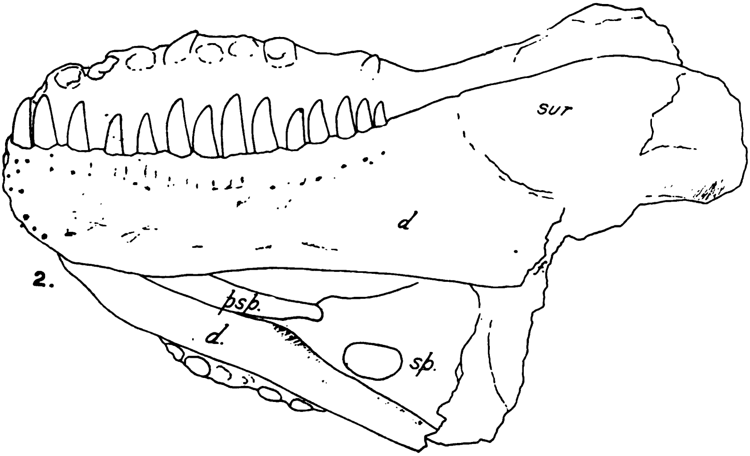
Nature-Study is a method rather than a subject. It better expresses the spirit by which one becomes acquainted with the common things about him than its definite content or subject matter. It is not getting information about nature from books, or lectures, or conversations with others; but it is rather a certain attitude of mind towards all the phenomena of nature. The end being development rather than mere knowledge, the teacher of Nature-Study thinks of the effect of his work upon his pupils rather than of the content of the subject he is dealing with; he considers *how* his pupils know rather than *what* they know.

WM. SCOTT.

Normal School, Toronto.



Dryptosaurus incrassatus, (Cope).



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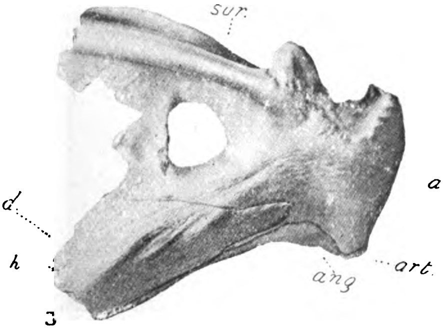

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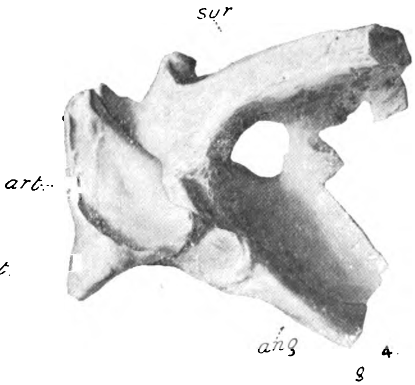

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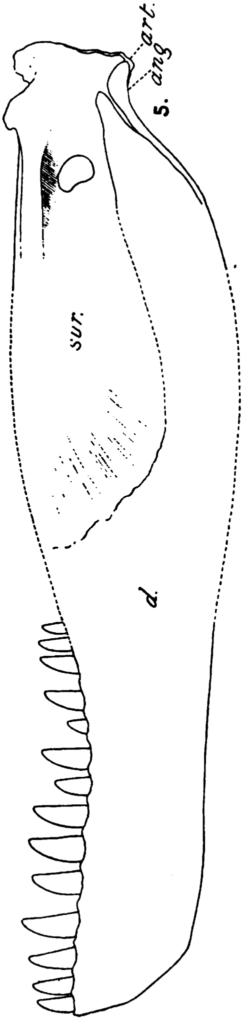

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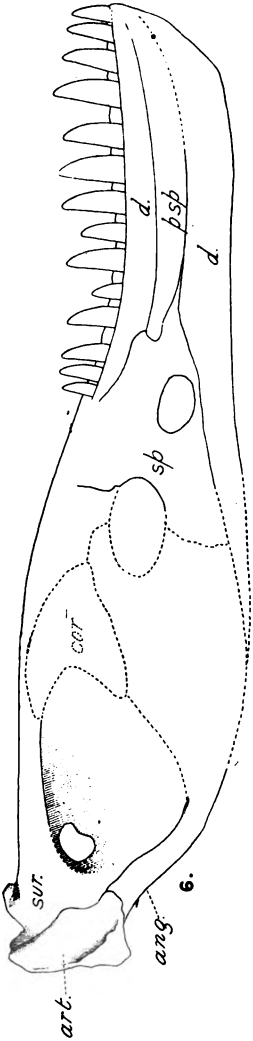

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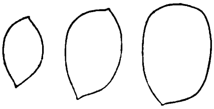

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Dryptosaurus incrassatus, (Cope)

UNIV

THE OTTAWA NATURALIST.

VOL. XVII. OTTAWA, DECEMBER, 1903. No. 9

BIOLOGICAL NOTES ON CANADIAN SPECIES OF VIOLA.

By THEO. HOLM.

(With two plates, drawn from nature by the author.)

In recent years North American, and especially Canadian, violets have attracted considerable attention on account of their very liberal contributions to the number of "undescribed species"; but it so happens that we have gained no further knowledge of the life-history of the genus than we already possessed from the time when the *Violaceæ* were studied from a thoroughly scientific point of view, when species were studied and treated as living beings with some power to adapt themselves to their environment and to vary, instead of as mere unnamed herbarium material. It really seems as if the species of *Viola* fared better at the time of Linnæus than they do now, for at that time they were at least classified in such a way as to become readily determinable, while in recent years the accumulation of supposed new species has gone on so rapidly as to leave the enumeration of these in anything but a systematic arrangement, with the omission of important morphological characters and regardless of natural affinities.

We naturally arrive at the conclusion that it would be more desirable and more beneficial to the study of natural science if we contented ourselves with a smaller number of species but well-defined and better appreciable from a biological view-point. The mere leaf-outline, the presence or absence of pubescence, the relative size and color of the perfect flower are deceptive characters, and even the position of the so-called "apetalous" flowers: aerial or underground, is far from constant. Systematic works, even of a very recent date, seldom contain anything new in the line of biology or morphology, since the authors generally content themselves with reproducing diagnoses that have been published long ago, instead of submitting the plants to a renewed study, whereby surely some new characters would be discovered; the only thing "new" to be found in such systematic works seems to consist in nomenclatorial changes: new combinations and new genera, based on specific rather than generic characters.

It is therefore to be hoped that Canadian botanists will undertake the work of studying such plants of their own, which need a revision, and, for instance, the *Violaceæ* would no doubt prove to be interesting from a biological view-point, besides that a close study of the various organs might reveal new characters of importance to the distinction of several critical species.[1] Some of these characters may be sought in the structure of both the perfect and cleistogamic flowers, in the leaf-variation, the structure of the rhizome and in the development of root-shoots. Having studied the genus from time to time, the writer thought that the publication of some observations upon the structure of these organs might be of some interest to Canadian botanists, besides that these notes might indicate the line of work to be pursued. We might begin with

THE FLOWERS.

Two kinds of flowers are known to occur in the genus *Viola:* the perfect, which we know is to be found in all the species, and the cleistogamic, which is far from uncommon, but which, nevertheless, seems characteristic of certain species, or perhaps better of certain sections of the genus; it is absent in *Viola pedata* and *tricolor* for instance. The perfect flower is, as we remember, hermaphrodite and zygomorphic, *i.e.*, symmetry in one plane; the sepals are prolonged backwards beyond their point of insertion, they are glabrous or hairy, often ciliate, and we have noticed much variation in their shape and in the length of their appendages; the corolla is polypetalous with the anterior petal larger and, sometimes, of a different outline from the others, besides that it bears a spur of variable length. The five stamens are closely applied to the ovary; they have short filaments, and at their summit generally a membranaceous appendage formed by the prolongation of the connective; the two anterior stamens are provided with a spur-like nectary, which protrudes a considerable distance into the petaloid spur; this nectary shows several modifications in North American species and ought to be studied and described in the diagnoses. Finally, the ovary has a club-shaped style and bears the stigma in a groove on the anterior side.

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[1] The very work suggested by Dr. Holm is now being carried on at the Central Experimental Farm by Dr. James Fletcher, who has under cultivation there all the Ottawa species and many from other parts of Canada. The results of Dr. Fletcher's studies will doubtless be given to the Club when they have been completed.—EDITOR.

These perfect flowers are, however, far from being always fertile, and it appears, from our own observations, as if they are sterile in a number of the acaulescent, purple-flowered species, at least in the vicinity of Washington, but whether these same species behave in the same way further north would be worth while determining. The other kind of flower, the cleistogamic, is often, but very incorrectly described as "apetalous," evidently from the fact that it has not hitherto been carefully examined in this country. The term "cleistogamic" is thus designated to such flowers as remain closed, in which the petals are merely present as rudiments or, sometimes, totally absent, and in which the stamens are reduced in number, besides that their anthers are small and contain but a few pollen-grains, which generally emit their tubes while still enclosed in the anther-cell. The pistil is in these flowers smaller than in the perfect ones, and the stigma is often scarcely developed. These flowers nevertheless produce a larger quantity of seeds than the perfect, and they have, in a number of cases, the power of burying themselves in the ground, where the seeds thus become ripened, or they are borne on erect, aerial peduncles like the perfect flowers.

Cleistogamic flowers are known from very nearly sixty genera, especially among the *Papilionaceæ*, *Acanthaceæ*, *Malpighiaceæ*, in certain species of *Oxalis*, *Lamium*, *Linaria*, *Drosera*, *Viola*, etc., while they are rare among the *Monocotyledones*: *Juncus*, *Hordeum*, *Leersia*, *Amphicarpum*, *Commelina*, etc.[1]

In the genus *Viola* these flowers were known already to Dillenius and Linnæus, which is readily to be seen from their diagnoses of *V. mirabilis:* "*Viola* montana latifolia, flores ex radice, semina in cacumine ferens Dill.," and "*Viola* floribus radicalibus abortientibus, caulinis apetalis seminiferis Linn." But besides *V. mirabilis* a few other old world species of the genus are known to produce cleistogamic flowers as, for instance, *V. odorata, silvatica, canina* and *persiæfolia*, some of which have been described and figured by Professor Warming in his Manual of General Botany (1895. p 546.). The structure of the cleistogamic flowers is not, however, identical in all the species, and in regard to the North American species we have noticed some peculiarities, which may prove useful in the distinguishing of certain species.

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[1] Compare Darwin: Different forms of flowers, p. 310.

The cleistogamic flowers remain constantly closed in the species which we have examined, and the general aspect is like that of *V. Macounii*, figured on our Plate IV, fig. 1, and the flower is nodding like the perfect. The sepals are normally developed and show a very prominent ciliation, but the petals are merely present in the shape of small warts; only two stamens are developed, (fig. 2) and in their natural position they are closely applied to the pistil. These stamens have large connectives, prominently denticulate along the margins, and the anthers are small and contain as usually only a few pollen-grains. The pistil has a short curved style, but no proper stigma is developed. These cleistogamic flowers of *V. Macounii* are sometimes buried in the ground, but at other times they are raised above the surface, borne on almost erect peduncles. It seems as if this varied position is due to atmospheric conditions; we have at least noticed that in several other species these flowers are only buried in the ground when the season is very warm and dry, while they develop above ground when the atmosphere is damp and cool. In *Viola papilionacea* the cleistogamic flowers are, thus, not always underground, and they differ from those of *V. Macounii* by having larger appendages on the sepals (fig. 5) and by these being glabrous. In this species there are, also, only rudimentary petals and only two stamens, which are somewhat larger than those of the former species. But in *V. sagittata* the cleistogamic flower is very much different. The appendages of the sepals (fig. 8) are long and narrow; the anterior petal is plainly developed (fig. 9), and there are three stamens (fig. 12), of which, however, only two have both anther-cells developed. One of these stamens has always, as in the preceding two species, the connective folded around the style and stigma, as shown in figure 10, and the structure of the anthers and the connective is identical. The cleistogamic flowers are in this species, *V. sagittata*, constantly raised above ground on erect peduncles of quite considerable length, and it appears as if the position of these peculiar little flowers might constitute, if not a specific, then at least a sectional character. And in looking over the several species in which cleistogamic flowers occur, we notice that some of the acaulescent, woodland types: *V. papilionacea*, *Macounii*, and *villosa* show a tendency of burying the flowers in the ground, while the bog plants: *V. sagittata*, *blanda*, *lanceolata*, *primulæfolia*, *affinis* and *cucullata* always bear the cleistogamic flowers on erect peduncles; on the other hand, *V. emarginata* and *ovata*, both inhabitants of sandy, gravelly hill-sides, bear the flowers raised above the ground. This varied position observed in the cleistogamic flowers depends evidently upon the character of the substrate: humus, wet boggy ground or gravelly soil, besides that, the atmospheric conditions may not be excluded. If the flowers and fruits of the bog species were buried in the wet moss, they would, no doubt, be exposed to decaying, and it seems very natural that *V. affinis* always bears these flowers raised above ground, when it occurs in swamps or wet meadows, while it partly buries them in the ground, when growing in thickets, border of woods, etc.

Very peculiar is the mode of growth observed in *V. rotundifolia*. The perfect flowers are in this species plainly developed from the axils of the basal leaves: acaulescent, while the cleistogamic are borne in the axils of cauline leaves: caulescent; it appears as if the stems which bear the cleistogamic flowers in this species are mostly subterranean, but we have seen one instance, however, where a stem bore a few green leaves instead of merely scale-like. In *Viola orbiculata* it is interesting to see that two sets of aerial stems with green leaves and flowers develop in the same season, and that the flowers of the first set are perfect and very showy, though sterile, while the later developed are all cleistogamic and closed, but produce seeds.

While thus cleistogamic flowers appear to be common to a number of species of *Viola*, there are certain North American species in which they are absent, for instance, *V. pedata* and *rostrata*. In *V. striata*, *Canadensis*, *pubescens* and *glabella* we have observed a few instances where the last developed flower was merely rudimentary, but with no signs of producing any seeds, while such were produced by all the perfect ones on the same stem. And in *V. sarmentosa* we have not succeeded in detecting a single cleistogamic flower in our herbarium specimens, and not in *V. Langsdorfii* either. We hope, however, that Canadian botanists will re-examine these species in the field, more especially the two last mentioned, since it is very important to learn something about the structure of the cleistogamic flowers in general in others than those described above

VARIATION IN LEAF-OUTLINE.

When numerous leaves develop from the same bud as in the monopodial, acaulescent violets, certain variation becomes always more or less noticeable in the leaves. Those that develop first, before the flowers, are frequently different from the later ones, and in certain species, *V. papilionacea* and *palmata*, for instance, the first of these are generally cordate or reniform, but entire, while the later ones, sometimes, are more or less deeply lobed. In *V. sagittata* the variation in leaf-outline is quite considerable, and we have, sometimes, noticed a number of forms upon the same individual during one season, from the oblong-ovate to the lanceolate, with the base hastate, or from the deltoid, entire to the deeply lobed, the latter being characteristic of the so-called *V. emarginata*. Such variation seems largely due to the position of the leaves in the bud, but there are, also, cases where the nature of the surroundings seems to affect the leaf-shape. *Viola emarginata*, for instance, does not develop the deeply cut leaves except when it grows in rich soil and in shade; in open places and in sandy soil the leaves become entire and often quite narrow like those of *V. sagittata*. *V. palmata* has always the later leaves deeply lobed, when growing in woods, while *V. papilionacea* shows a pronounced lobation, when observed in damp, shaded places, along creeks, etc.

The caulescent violets show but a slight variation, which m restricted to the mere serration or crenulation of the leaf margin. But the most conspicuous variation is to be observed in *V. pedata*, if we compare the leaves of the mature plant with those of the rootshoots. Some of these types of leaves are figured on our plate (Plate V, figs. 13-16), and we notice the great divergence between the normal leaf (fig. 13) and the smaller one (fig. 14), which was taken from a one year old specimen. In the rootshoots (figs. 15-16) the leaves show a tendency to becoming almost entire, and one would hardly have suspected them to belong to this species, if it were not for the fact that we succeeded in preventing them from breaking off when the mother-plant was lifted.

Considering these few but well marked cases of leaf-variation in *Viola*, we might suppose that several of the recently described new species, in which the outline of the leaf constitutes an important part of the diagnosis, may be referred to some single type with ability to adapt itself to the surroundings, and to exhibit a certain amount of variation. And we must remember that besides varying in leaf-outline these same species do, also, vary in respect to the pubescence, which is still more influenced by the conditions of the surroundings, character of the soil, light and shade, etc., and it can, of course, only be ascertained through prolonged study in the field whether such plants are sufficiently constant in their mode of growth so as to be considered as valid species.

THE RHIZOME.

Few organs are as constant in their structure as those which constitute the rhizome, the under-ground stem-portion, with its leaves and roots ; yet it is very seldom that recent authors pay much attention to this part of the plant, when they describe new species ; in regard to *Viola* it is generally passed by in silence. The following types of rhizome are observable in the Canadian perennial species of *Viola :*

A. Rhizome vertical, monopodial, leaves all basal with axillary flowers :

V. pedata.

B. Rhizome horizontal, otherwise as in A :

V. sagittata, affinis, Macounii, cucullata, palmata, papilionacea.

C. Rhizome horizontal or ascending, monopodial, with basal leaves from the axils of which aerial stems develop with leaves and flowers, but no stolons :

V. pubescens, glabella, orbiculata.

D. Rhizome a sympodial pseudorhizome with basal leaves, etc., as in C :

V. Canadensis, striata, rostrata.

E. Rhizome horizontal, monopodial, leaves all basal with axillary flowers and stolons with scale-like leaves :

V. Leconteana, primulæfolia, Selkirkii, blanda, lanceolata.

As may be readily seen from this table, the monopodial ramification seems the most characteristic, while the sympodial occurs only in a few species. Of these two kinds of branching, the monopodial is in *Viola* recognized by its continuous growth in one direction and by its terminal bud developing only leaves with axillary shoots : floral or vegetative, of which the latter continue the same development of leaves and without being terminated by a floral axis. These lateral shoots, however, do not attain the same length or the same strength as the mother axis, unless in cases where this becomes injured and dies off. It is thus characteristic of the monopodium that the terminal bud remains vegetative and for an indefinite period.

The sympodial rhizome is in *Viola* but sparingly represented, and as a matter of fact it does not occur as a true rhizome in the stricter sense of the word. We have called it a pseudorhizome, because the under-ground stem-portion is here (in *V. Canadensis.* etc.) only represented by the bases of the aerial shoots, from the lowermost leaf-axils of which buds develop, which in the following season grow out into above-ground shoots. But there is no under-ground mother-axis in these species, and, moreover, each bud becomes terminated by a floral shoot with cauline leaves and axillary flowers. And it is seen without much difficulty when we examine *V. Canadensis* that the fresh, flowering shoots are, always, borne upon the base of an old, withered stem from the previous year. One might suppose that *V.*

pubescens, *glabella* and *orbiculata* ought to be reckoned of the same group as *V. Canadensis*, but in these species as well as in the more southern *V. hastata*, the above-ground stems are readily seen to have developed directly from the rhizome and in the axils of leaves, pertaining to the terminal bud. In other words, their rhizome represents a monopodium just as typical as the one described above, with the only difference that in the one case only flowers develop, while flower-bearing stems develop in the other. These flower-bearing stems die down to the ground without leaving any basal buds for reproduction; this is secured by the terminal bud of the under-ground main-axis.

In *V. pedata* the rhizome is constantly vertical; it is rather short, but quite thick, and the primary root persists for about two years. In *V. papilionacea*, *affinis*, etc., the rhizome is horizontal, somewhat longer, but the internodes are barely visible. The thickness of the rhizome is in these species (B) as well as in *V. pedata* due to the swollen bases of the petioles, as we have described in a previously published paper.[1] In *V. primulæfolia* and its allies (E) the rhizome is quite slender, and these species are characterized by their more or less profuse development of long, very slender, subterranean stolons, each of which becomes terminated by a rosette of leaves like the mother-shoot, and in which the same monopodial branching takes place.

The peculiar instance of both caulescent and acaulescent flowers developed upon the same rhizome is illustrated by *V. rotundifolia*, as described above. However, our material was rather scant of this species, thus we were unable to make out whether the cleistogamic flowers are borne on stems that are aerial or subterranean under normal conditions.

In *V. sarmentosa* we have a type which is very different from all the others on account of its sarmentose habit. The stolons are, as it appears from our dried material, always above ground, inasmuch as they all bear typical stem-leaves, but scattered, not forming a rosette as in the monopodial species. None of our specimens showed any rhizome, but they were all developed from stolons, which had rooted and become separated from the mother plant. Canadian botanists are urgently requested to study this species in order to explain its mode of growth from young to adult stage, and especially to demonstrate the structure of the rhizome and of the cleistogamic flowers, if such are present.

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[1] Memoirs of the Torrey Botanical Club. Vol. 2, No. 3, p. 66.

In comparing the rhizomes of these Canadian violets with European species, it is interesting to notice that there is only one, *V. mirabilis*, which exhibits the same growth as *V. rotundifolia*, and that these two species are not to be considered as near allies, since the former has the flowers light purple, the latter, on the contrary, yellow. In *V. odorata* the rhizome is monopodial and the flowers as in our acaulescent species, but there are also runners, which stay above ground and which develop rosettes of leaves at their apex, thus repeating the growth of the mother-rhizome. The caulescent *V. sylvatica* and *V. Riviniana* agree in all respects with *V. pubescens* and its allies, while the pseudo-rhizome of *V. Canadensis* is readily recognized in the European *V. canina*, *stagnina*, *elatior* and a few others, which have been described by Professor Hjalmar Nilsson.[1]

THE ROOTS.

The primary root persists for about one season in these perennial species of *Viola*, but is soon replaced by adventitious, which in the monopodial types develop from the base of the petioles from four to five together, or scattered along the internodes of the stolons, as in *V. primulæfolia*, etc. These roots are usually of two kinds: nutritive and storage, of which the latter are quite common in the monopodial species of the groups A, B and C; they are not very thick, however, but possess, nevertheless, a large parenchymatic tissue of the cortex with an abundance of starch, and correspond well with this type of root as described by Dr. Rimbach.[2] No contractile roots were observed.

THE ROOTSHOOTS.

This form of shoot has only been observed in *V. pedata*, as described above, and we might state here, that the shoots develop at the tips of the roots and that they remain in connection with the mother-plant for at least two seasons; they commence to bloom in their second year. But in no other American violet have we, so far, detected rootshoots, and they are not very well known among the old world species either. Wydler and Irmisch noticed them in *V. sylvatica, Riviniana* and *canina*, and Professor Warming found them in *V. elatior.*[1] It would seem that they might be found among the corresponding American homologues, viz.: *V Canadensis, striata* and *rostrata*, and perhaps also in the species of the group C.

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[1] Acta Universitatis Lundensis. Vol. 19. 1882-83, p. 205.

[2] Berichte deutsch. botan. Gesellsch. Vol. 17. 1899, p. 18.

In considering the means of propagation, floral and vegetative, as possessed by these Canadian species of *Viola*, it seems as if those of the group E (*V. primulæfolia*, etc.) are the best equipped, since they produce stolons and develop seed-producing flowers besides; these species are, thus, able to wander and spread themselves over a larger area than the others, in which stolons do not occur. *Viola pedata*, with its short and plump, vertical rhizome, is, nevertheless, possessed of some power to wander by means of the rootshoots. But in all the other groups (B, C and D) the structure of the rhizome does not enable the individual to spread over any large area, and the principal distribution is in these species secured by the seeds, which are ejected with much violence and thrown to a great distance by a peculiar mechanism of the carpels. This manner of dispersing the seeds becomes, of course, much impeded when the cleistogamic flowers bury themselves; it may be for this same reason that the bog-species have their pods raised high above the wet, mossy substrate, by which the dispersion of the seeds become better secured than otherwise.

Brookland, D.C., September, 1903.

EXPLANATION OF PLATES.

PLATE IV.

Fig. 1—*Viola Macounii.* A cleistogamic flower, magnified.

Fig. 2—Same species. A cleistogamic flower laid open, showing five sepals, rudimentary wart-like petals, two stamens and the pistil, magnified.

Fig. 3—Same species. The pistil and the two stamens in their natural position, magnified.

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[1] Botan. Tidsskr. Ser. 3. Vol. 2. Copenhagen, 1877-79, p. 63, and Botan. Notiser. Lund., 1884, p. 32.

Fig. 4—Same species. The apex of the pistil with the style and stigma, magnified.

Fig. 5—*Viola papilionacea.* A cleistogamic flower, with the sepals, excepting the appendages, removed ; the petals are represented by small, wart-like organs, and the stamens are closely applied to the pistil, magnified.

Fig. 6—Same species. A stamen showing the two anther cells and very large, ciliate connective, magnified.

Fig. 7—Same species. The pistil, magnified.

Fig. 8—*Viola sagittata.* A cleistogamic flower showing only the long appendages of the sepals and the pistil, magnified.

Fig. 9—Same species, showing a small petal, the anterior, two stamens and the pistil, magnified.

Fig. 10—Same species. The pistil and a stamen, magnified.

Fig. 11—Same species. A stamen with the anthers very irregularly opened, magnified.

Fig. 12—Same species. The three stamens of the flower, magnified.

PLATE V.

Fig. 13—*Viola pedata.* A typical leaf, of an old specimen collected in the month of August. Natural size.

Fig. 14—Same species. A leaf, one of the earliest developed, of a young specimen, one year old, collected in the month of April. Natural size.

Fig. 15—Same species. A rootshoot, collected in the month of June. Natural size.

Fig. 16—Same species. A rootshoot, collected in the month of June, showing various forms of leaves. Natural size.

ADDITIONAL NOTES ON SOME CANADIAN SPECIMENS OF "*LITUITES UNDATUS.*"

J. F. WHITEAVES.

Since the publication of a previous paper on this subject, in the October number of this journal, additional information has been obtained in regard to some of the questions discussed in it.

In the first place, Dr. W. Y. M. Woodworth, curator of the Museum of Comparative Zoology at Cambridge, Mass., has kindly lent the writer the types of Hyatt's *Plectoceras obscurum*, so that it has now become possible to make a direct comparison between them and a large series of presumably authentic specimens of *Plectoceras Halli* (Foord). Such a comparison has resulted in the conviction that, although *P. obscurum* may be, and doubtless is, quite distinct from the *Inachus undatus* of Emmons, which Hyatt calls *Eurystomites undatus*, there is no appreciable difference, either in external form, in the surface markings, or in the shape and position of the siphuncle, between *P. obscurum* and *P. Halli*. The types of *P. obscurum* are three in number, one a comparatively perfect specimen from the Black River limestone at Watertown N.Y., marked 2077; and the others, two fragments from the Birdseye limestone at Watertown, each marked 2078. The specimen marked 2077 has nearly the whole of one side worn away, but the other side shows the general shape of the shell and its surface markings very well. It is about three inches and a half in its maximum diameter and consists of two entire whorls. The inner whorls, if there were any, are not preserved. Both sides of the specimen show that the whorls are at first so closely coiled that the inner half of the outer whorl is in close contact with the one that immediately precedes it, but that its outer half is free and slightly uncoiled. At the anterior end of the shell, the outer whorl is about twelve millimetres apart from that which immediately precedes it. And it would seem to be the body chamber, which occupies rather less than one-half of the outer whorl, that is free and separate. The surface markings are precisely similar to those of the fine specimens of *P. Halli* collected by Mr. Weston at Lorette. On the worn side all the septa but the last are obliterated, and the shape and position of the siphuncle are not at all clearly shown. A label, in Hyatt's hand-writing, however, which accompanies the specimen, states that the siphuncle is "marginal and ventral" as it is known to be in *P. Halli*. The two fragments marked 2078 show neither the external form of the shell, the outline of the transverse section, nor any of the surface markings. One of these is a little more than about one-third of the outer whorl of a specimen which has been worn down in such a manner as to show a longitudinal section of the body chamber and of the last five septa, which average from five to five and a half millimetres in their greatest distance apart. The other shows scarcely anything, except that the venter is much flattened.

In the second place, *Plectoceras Halli*, which seems to be a very characteristic fossil of the Black River limestone, has now been found at two localities near Ottawa city. The first of these is Lot 4, Concession 3, Rideau front, Gloucester, where the specimen referred to in a former paper was found by Mr. Walter R. Billings. The second is Mechanicsville, on the Ontario side of the Ottawa River at La Petite Chaudière rapids, where a specimen which shows both the surface ornamentation and the position of the siphuncle remarkably well, was found by Mr. J. E. Narraway in October last.

In the third and last place, on a tablet in the Museum of the Geological Survey there are four fossils from the Black River limestone at St. Ambroise, P.Q., collected by Sir W. E. Logan in 1852, that are still labelled "*Lituites undatus*." Three of these are apparently small specimens of *Plectoceras Halli*. The fourth is clearly neither that species nor *Eurystomites* (or *Plectoceras*) *undatus*. It is unfortunately not more than an inch and a quarter in its maximum diameter and does not show the position of the siphuncle, so that it is quite uncertain to what genus it should be referred. A similar but rather larger specimen, which also does not show the position of the siphuncle, has quite recently been found by Mr. Narraway in the Black River limestone at Tetreauville. Both of these specimens are apparently gyroceraconic, with laterally compressed whorls, and their surface markings consist of thin sharp ribs, with shallowly concave spaces between them. These ribs curve concavely and rather widely forward on each side, and narrowly and convexly forward on the venter.

It would therefore appear that in Canada the true *Inachus undatus* of Emmons, which Hyatt refers to *Eurystomites* but which may be a *Plectoceras*, has only been found near Kingston, in the Black River limestone. Also, that all the specimens from that formation in the Province of Quebec which have been called *Lituites undatus*, and similar specimens from the Black River limestone near Ottawa, are either *Plectoceras Halli* (Foord) or an at present undetermined and possibly undescribed species, whose generic relations have yet to be ascertained. And that *Plectoceras obscurum* is a synonym of *P. Halli*.

ERRATA IN PREVIOUS PAPER.

On page 119, line 11 from bottom, for "losely" read loosely.
,, 120, line 9 from bottom, for "1861" read 1891.
,, 121, line 2 from top, for "*P. Foordi*" read *P. Halli*.
,, 121, line 7 from top, for "sipuncle" read siphuncle.
,, 121, line 8 from top, for "specimen" read species.
,, 121, line 9 from bottom, for "surtural" read sutural.

Ottawa, Oct. 20th, 1903.

BIRD NOTES.

CANADIAN RUFFED GROUSE (*Bonasa umbellus togata*).—An incident illustrating the velocity of flight of the ordinary so-called Birch Partridge of this district, occurred in the middle of September last. As I was sitting at my office desk, I was startled by a loud crash of glass close above my head, accompanied by a shower of fragments. Upon examination, I found that one of the above-named birds had flown through the window. The pane broken was of thick double diamond glass, 3 ft. 4 in. long by 1 ft. 7 in. wide. The bird had been raised by a dog, about fifty yards from the building, and had flown straight at the window, possibly thinking it was an opening through which it could escape. The velocity was so great that the bird was killed almost instantly, and the breast bone and furcula or wish-bone were crushed.

PINE GROSBEAK (*Pinicola enucleata*).—On October 30th, on a lawn at the Central Experimental Farm, I saw and watched closely for some time a small flock of about a dozen Pine Grosbeaks, which were busily engaged eating the seeds of the small

Asiatic maple (*Acer Ginnala*), the fruit of the Berry-bearing Crab (*Pirus baccata*), and the berries of the Mountain Ash. None of these birds had the rich plumage of the adult male. I cannot remember in previous years noticing any of these birds so early in the autumn. Mr. Harrington, however, tells me that he saw about a hundred of them on the ground and in the trees along Meech Lake, Que., on the previous Sunday, October 18th. Mr. W. E. Saunders also saw them at Rat Portage in October, but this last named locality is of course much nearer to their breeding grounds than we are.

The chief object of this note is not, however, so much to record the occurrence of these birds as to urge the members of the Field-Naturalists' Club to try and prevent the senseless destruction by thoughtless boys of these beautiful and delightfully tame winter visitors. They are so tame and confiding that without the slightest difficulty they can be approached within six or eight feet. We have far too few of our bird friends which visit us in the winter, and all should do their utmost to protect those few which do come to us, as our guests, for food and shelter, in winter time.

Very few boys are really cruel; but nearly all are ill-informed concerning the common objects of the country. Pointing out that a thing is wrong seldom has the effect of preventing boys from doing it; but might we not appeal to them by pointing out the cowardice of killing such beautiful and gentle creatures as these little birds, which do not make an effort to protect themselves and trust us so much, as hardly to get out of our way when we come within a few feet of them? Catching these wild birds and putting them in a cage is practically destroying them, because very few of those caught will live in a cage, and they are perhaps the least suited of all of our wild birds to be kept in captivity. Although the soft notes are charming when heard in a state of nature, the song is not such as would justify anyone for keeping the Pine Grosbeak in captivity. As cage-birds, they are large clumsy birds which scatter their food and make a great mess, and they soon become uninteresting to their captors. Lastly, they are Arctic birds which only come south in the winter, and, although with great care they may be kept through a summer, with the exception of perhaps one in a thousand, all die as soon as the hot weather comes.

JAMES FLETCHER.

NATURE STUDY—No. VIII.

The Proposed Course in Nature Study for Public Schools.

S. B. Sinclair, Ph.D.

At the annual meeting of the Ontario Education Association in Toronto last Easter, a draft of "proposed changes in the Public and High School Courses of Study" was submitted for consideration, and in all probability these changes (with minor modifications) will come into effect at an early date.

In this scheme it is proposed to make a somewhat definite course of Nature Study compulsory for all classes in Public Schools, and to insist that all Public School teachers take an extended course of training in Natural Science before entering the Normal School. This forward movement cannot fail to be of interest to every reader of The Naturalist, and in future discussions it may be of value to know something of the content and sequence of the Nature Study material which is to be dealt with in the Public School.

The following is a brief outline of the proposed Course of Study for the first four classes :

FORM I.

Note.—From the character of Nature Study, the course therein must be more or less elastic, and a selection should be made therefrom subject to the approval of the Inspector. The acquisition of knowledge should be secondary to the awakening and preserving the pupil's interest in nature, and to training him to habits of personal observation and investigation. The topics are suggested as suitable ones from which a course which will meet the conditions of the school may be selected ; but the treatment must be suited to circumstances, age, and experience of learners, and to the seasons of the year, accessibility of materials, etc.

Animal Life : Habits of pet animals, their care and food ; domestic animals on the farm, their care, habits and uses ; birds, their nesting, song, food, migrations in the autumn ; metamorphosis of a few conspicuous butterflies or moths.

Plant life : Work in school garden ; study of a plant, as a geranium or pansy, from slip or seed to flower ; caring for plants in pots ; buds, their preparation for winter, their development ; autumn leaves, collection, forms, tints; economic fruits, collection, forms, how stored for winter, fruit as seed holders, dissemination of seeds ; roots and stems, comparison of fleshy forms, uses, how stored for water.

Life on the Farm : Harvesting, primitive and modern methods compared ; preparation for winter ; the barn and its uses ; activities of the farm during winter ; winter sports and social life on the farm ; the varied operations of spring time.

Observations of rain, snow, and frost ; spring time as awakening to new life, effects of sun and moisture on the soil.

FORM II.

Course of Form I. continued. Animal Life. Life history and habits of domestic animals and familiar wild animals, as squirrel ; earth-worm, habits, structure, uses ; toad, habits, structure, uses ; observation of live insects and their activities, comparison of young and adult stages.

Plant Life : Cooperative and individual work in school garden ; cultivation of plants in pots with observation of the development of leaves and flowers ; parts of leaves and flowers ; change of flower to fruit and fruit to seed ; functions of the parts of flowers ; the forms and uses of trees ; activities connected with forestry and lumbering, connect with study of pioneer life and present conditions on the prairie.

Different kinds of soil, as sand, gravel, loam, leaf-mould, and clay ; experiments to ascertain how soils are composed, whether of mineral or of decayed organic material, and which best retains water ; additional phenomena of spring in the vicinity of the school, cause of melting snow, floating ice, etc.; how nature prepares the soil for growth of plants.

Observation of farm, garden and household operations.

FORM III.

Course of Form II. continued. Animal Life : Adaptation of different kinds of animals to their respective habits ; birds, life history of types, habits of wild fowl in different seasons ; fish, forms and uses of different parts of the body, food and how obtained ; life histories of moths, butterflies, beetles and grasshoppers ; useful insects, as ladybird and dragon-fly ; harmful insects and methods of destroying them.

Plant Life : Germination of seeds under controllable conditions and in the school garden; more particular study of the forms and functions of the parts of plants, and variations in these forms and functions in different plants; observations on the culture of farm and garden crops and orchard and shade trees; the observing and the distinguishing of the common forest trees.

Observing local minerals and rocks, their properties and uses; experiments on different kinds of soil; distinction between hard and soft, pure and impure water, test and methods of purification of water.

Sources of Heat: Experiments to show the effect of heat in the expansion of solids, liquids and gases; practical applications. Temperature; thermometer, construction and graduation. Methods of transmission of heat, conduction, convection and radiation; causes of winds and ocean currents; ventilation.

FORM IV.

Course of Form III. continued. Animal Life: Relation of fishes, birds and wild animals to man; life histories of conspicuous and economic insects; organ and functions.

Plant Life: Study of organs of plants and their functions; study of economic and wild plants from seed to fruit in the school garden, home garden, farm and forest; weeds injurious to crops and methods of destroying them; buds and twigs; wood, rings, grain, and bark, uses, etc. Experiments to show composition of soils and their relation to drainage, temperature, etc.; varieties of soils adapted to different crops; fertilizers, etc.

Implements and tools used on the farm and in the household, mechanical principles applied in their construction.

The atmosphere, its composition. Combustion: simple experiments, study of candle flame products. Changes produced in the air by respiration. Reciprocal relation of plants and animals as regards the atmosphere; impurities in air. Gravity: air and liquid pressure; the barometer. Cohesion and adhesion, the nature of these forces; phenomenon of solution and diffusion; amorphous and crystalline forms of matter. Practical use of heat, steam and electricity in connection with the study of industries.

FORM V. AND CONTINUATION CLASSES.

The work outlined for this class is too extended to allow of reproduction here. It includes definite courses in Botany, Zoology, Physics and Chemistry, based upon work taken in previous classes and treated by a more purely scientific experimental method.

THE TEACHER'S PREPARATION.

The courses of study in the High Schools are to be taken up in three main divisions ;

(*a.*) Lower school, covering from two to three years ;

(*b.*) Middle school, from one to two years, and

(*c.*) Upper school, two years.

Teachers seeking Junior Non Professional standing are to be examined on the Experimental Science of the Lower school course and the Physics and Chemistry of the Middle school course.

Physics and Chemistry are to be taken during four years instead of during one or two, as is now the case. These subjects are to be taken only during the winter months, in the Lower school course, Botany and Zoology being taken during the fall and spring months.

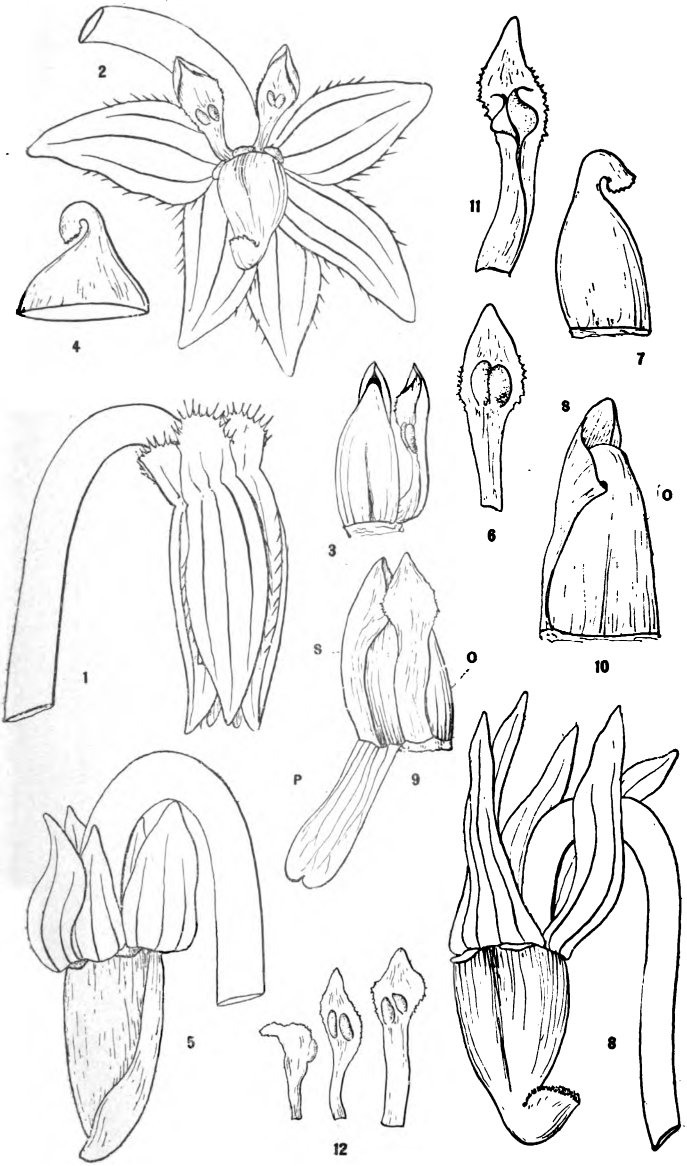
The course in Botany includes a study of representatives, such as flowering plants, ferns, fungi, etc., and deals with structure, life-relations, plant societies, plant physiology, etc.

The course in Zoology is designed to include representatives of the animal world. Special attention is directed to insects and birds, life-history, habits, adaptation to climate, etc.

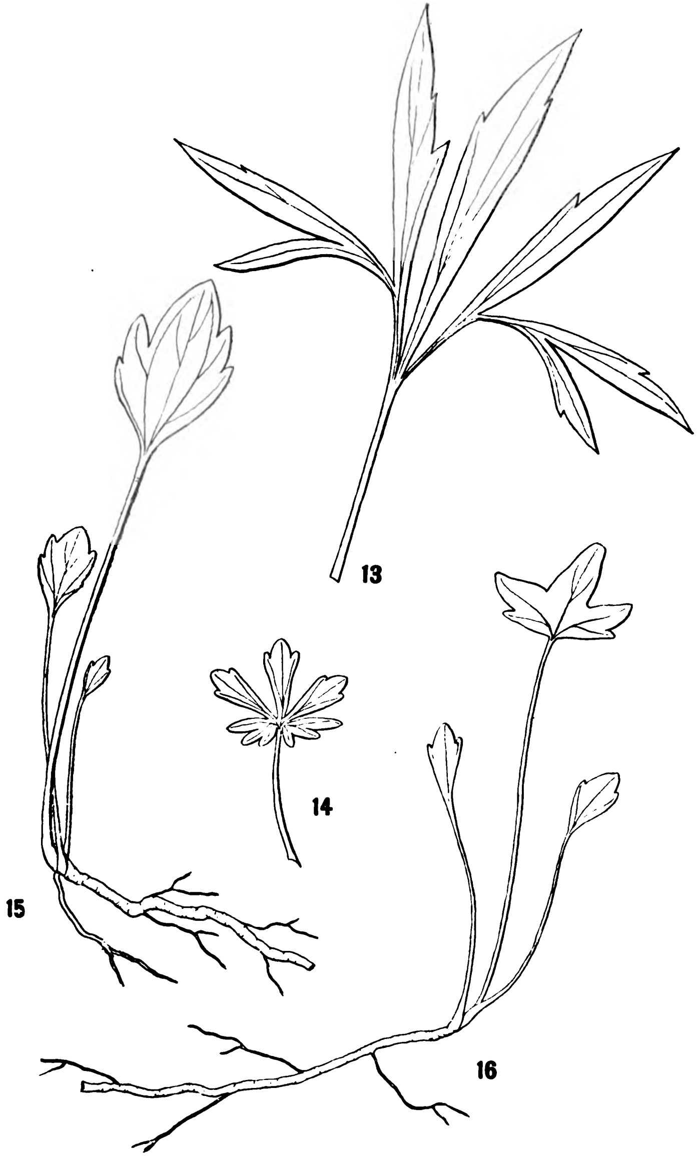
In both courses the work is intended to be practical, and, to ensure this, class text-books are not to be allowed.

Speaking generally, the proposed course in Natural Science (compulsory for teachers in training before entering the Normal School) will extend over from three to four years and occupy one lesson period per day.

During the Normal term the teacher in training will review the work done in the High School, and reconstruct it from the standpoint of the learning process. On the psychological side, he will study the subject in its logical sequence and in its relation to the needs and powers of the developing mind, with a view to the proper selection and arrangement of material and to the best methods of presentation. On the historical side, he will familiarize himself with the best of what has been done and is being done elsewhere, in order that he may avoid errors and avail himself of the advantages of past experiment. With such an equipment by way of preparation, the teacher who possesses growing power and enthusiasm, should be able to render efficient service, and this is an important consideration ; for, after all, the success of the movement must rest very largely in the hands of the teacher.



Holm: Notes on Violets. Cleistogamic flowers.



Holm; Notes on Violets. Leaves and root-shoots of Viola pedata.

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THE OTTAWA NATURALIST.

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REMARKS ON SOME MARSH DWELLERS.

By LEWIS M. TERRILL, Montreal.

(Read before the McIlwaith Ornithological Club.)

Not having previously had access to a locality suitable for the study of waterfowl, on June 6th, 1903, I decided to visit the marshes in Lake St. Francis, near Summerstown, Ont., about forty miles from Montreal.

During our drive from the station to the lake shore my friend pointed out a former nesting site of the sparrow hawk, a scarce summer resident in Montreal. Arrived at the lake, we had a short row to Stanley Island, where we found excellent accommodation at the Algonquin Hotel.

The waning light now warned us that we had barely time for a short survey of the island, and during our walk we noticed where a kingfisher had burrowed in the crumbling bank, while later, when darkness had fallen, we flushed a bobolink from its nest and eggs. Owing to continued drought, the cover afforded ground birds was very scant and this particular bird, ignoring concealment, had built her nest flush with the ground amongst last year's stubble, trusting to protective coloration, which was aided by the eggs being conveniently of a grayish appearance in place of the usual rich brown.

Before five o'clock next morning we were well on our way toward the nearest shallows, the chucking of gallinules our guide through the lifting mists. Arrived at the first marsh, distant one-half mile from the mainland, we took our first plunge, dispelling any lingering drowsiness and startling a pair of gallinules into hurried flight. A shallow platform of dead rushes fastened to reed stalks and elevated several inches from water level, was soon found containing eleven eggs of this species (*Florida Gallinule*). Nearby, a floating mass of dead rushes, the home of a pair of pied-billed grebes, allowing that they were sometimes at home, held five eggs partially covered with rushes laid lengthwise of the nest.

Leaving the open water and coming to a more central portion of the island, we were in the home of the long-billed marsh wren, whose long tails were far more conspicuous than their bills. When startled from the rushes they appeared to have some definite destination in view and would solve the problem of getting there by a direct mathematical flight on quickly whirring wings, swerving neither to right nor left. Their globular nests were everywhere, and resembled those of the field mouse but were very strongly woven with rushes with a lining of feathery down from the bullrushes. The entrance was a small round hole in the side, which, in the first nest, I did not readily find, but later I observed that it invariably opened out between the rushes to which the nest was fastened. The nesting sites were chiefly in clumps of last year's rushes, when they were composed of dead material. Many birds, however, fastened their nests to the long rank grasses which covered the marshes where the water was only a few inches deep. In the latter choice, green grasses were used in building, the wrens thus blending the color of their homes with that of the immediate surroundings. Often three or more nests appeared to be the property of one pair of birds, those occupied being several yards apart. The surplus nests are probably built with the purpose of discouraging enemies, or possibly having cause to fear rising of water, the birds are not satisfied with their first attempts.

One nest that I found contained four eggs of a pure glossy white, without a sign of coloration. They were slightly malformed and almost globular in shape, measuring: .58 x 53; .58 x 52; .59 x 54; .57 x 53, averaging .58 x 53, whilst an average specimen of the normal egg measures .66 x 49. In two of these eggs incubation was somewhat advanced, whilst the other two were almost fresh. It has been suggested to me that these albino eggs might be the short-billed marsh wrens. The same idea caused me to stand in one and one-half feet of water for a considerable time, though I was not rewarded with the sight of any other wren than the long-billed.

Referring to authorities, I find that measurements of eggs of the two species are practically the same. Taking these facts into consideration it would seem inconsistent that the first short-billed observed breeding in this locality, out of its regular habitat, should lay an unusually small set of malformed eggs, reminding one of badly formed clay marbles, in different stages of incubation, with measurements at variance with normal.

On a low boggy island, less marshy than others, and partially covered with alders, we saw several woodcock and snipe (Wilson's, I believe). Here we found the Sora and Virginia rails nesting. Their nests, miniature gallinules, though better hidden, were fastened low down amongst the long marsh grass, the birds acting much in the same manner as the bobolink in leading one from the nest, always rising several feet away.

From the further end of the island an ever increasing clatter notified us of the presence of a colony of black terns. They came and went, after the manner of their namesakes of the clay bank. Their apologies for nests were placed on slight elevations in boggy spots, where vegetation had slight chance, sometimes a rock, a piece of driftwood, or again a solitary tuft of short grass being chosen. The eggs were the landmarks, as the nests were barely noticeable without them. Another colony breeding in a marsh where the water was two or three feet deep, simply laid their eggs on the surrounding floating mass of reeds.

The only bare spot amongst the rank growth in this marsh was the home of a pair of terns.

I failed to mention that notes on the brown creeper and Hudsonian chickadee, appearing in a recent issue, were taken at Robinson, Compton County, 125 miles S.E.E. of Montreal.

A WOMAN'S VISIT TO A PEAT BOG. PLENTY OF FUEL FOR CENTURIES TO COME. A VISIT TO THE NEWINGTON PEAT WORKS.

After an early breakfast, which to a woman living in chambers, with the aid of a gas stove, was a thing of despatch, a woman journalist, a fair-haired teacher in a Ladies' College, and a bright, joyous enthusiast with the breeziness of a Canadian prairie characterizing her, set out from Ottawa on a tour of investigation.

At the Central Depot a train on the Ottawa and New York Railway was boarded, and the party was augmented by the addition of five scientific men: a geologist, a chemist, and botanists and entomologists—men whose names are household ones in Canada.

It was a mid-October morning, a morning with the wine of joy in it, clear, mellow, with the faint scent of frost in the air. With Lampman we sang—

> "Silvery-soft by the forest side,
> Wine-red, yellow, rose,
> The Wizard of Autumn faint, blue-eyed,
> Swinging his censer, goes."

The scientific men were armed with botanical cases and kodaks, the weaker sex with lunch boxes, and magazines, which were never opened until the return journey.

The officials of the Ottawa and New York Railway were polite and attentive, the cars ran easily, and after a pleasant journey of perhaps an hour and a half, the neat little station of Newington was reached, forty miles from Ottawa. Here wraps were deposited, and a walk of over two miles on the rail-tracks was taken.

With iest and good-humoured raillery, here and there in spots, little earnest discussions on the plants, insects, and birds discovered in passing, were indulged in. At last the tall chimneys and brick walls of the Newington Peat Works were seen in the distance, and, following the switch on the railway track, we came to our destination. Here we were met by the energetic president, Dr. Spencer, and his efficient manager, Mr. Gray, who were kindness itself in explaining all about the works. A number of men were engaged in conveying the brick-like blocks of peat that issued from a great iron machine in continuous procession, to large iron tramcars, which were run on rails into the huge brick drying chambers on either side of the driveway. Massive iron doors, studded with iron bolts, shut in the tramcars with their precious burden with a clashing sound, and then the heat was turned on, fierce, terrific, the furnaces, when the doors were opened for a second, belching out fire and smoke like Dante's Inferno.

To the scientific of the party the process of heating and draughts was explained. Behind the furnaces were rows and rows of peat blocks, drying in the sun and air to be used in the furnaces.

Then we were taken to the bog. A narrow trestlework, supported a cable-like arrangement by which the peat was carried in something like the conveyors in a flour mill, the lower ones from the bog full of peat, the upper ones returning empty.

Our three dauntless females followed their attentive guide on this very narrow pathway, a tight-rope feat bravely carried out despite the instructions of the fatherly one of the party, who held his breath between times and occasionally ejaculated "Don't talk," "Go slow," "Watch your footsteps." Once we did look around to see the deep-voiced one of the party taking a snap shot of us on our perilous journey.

At last the opening in the bog was reached, where the derricks were placed, with knives descending and clasping the peat and bringing it to the surface. Here it was shovelled aside to dry, by a stalwart German in overalls, who might be a study for a painter or sculptor, with his grace of action and magnificent proportions. The cranks of the derricks were turned by the ladies of the party, and only once they struck a snag and needed assistance. We learned that as soon as the space is large enough steam dredges will be set to work bringing up larger quantities of peat.

It takes Nature fifty years, it is said, to make a foot of peat, and, as the bog here has over thirty feet of peat, as was shown by a slender iron rod driven down for our benefit, one can imagine how almost inexhaustible is the supply.

This "household fuel" is economical, clean and non-odorous.

It will burn in almost any stove, or in the open grate, and it can be regulated at will. Industrial coke is made by carbonization, it welds steel and iron admirably and will stand burden in furnace. The by-products are valuable; these are obtained from coke making and distillation.

The machines and diggers used are from Europe and have many medals for efficiency; they are the first imported into Canada. The Newington plant will turn out 50 tons of fuel daily as soon as it is in regular working order.

Having armed ourselves with a quantity of the beautiful pink moss or sphagnum which forms a large proportion of this peat in its original state and which covers the surface of this bog for thousands of acres, with here and there scrubby spruces, larches and cedars, pitcher plants, and many swamp shrubs – Labrador tea, sheep's laurel, cassandra, andromeda, blueberries, etc.—we started on our way back.

At the works we were presented with blocks of peat in its finished state, ready for our grate fires, the scent of which would take some of us back in memory to the old home across the sea, and the hills of Wicklow would rise before our mind's eye, and care and sorrow be a thing of the past.

All the employees of the works were photographed, grouped in front of the buildings, and we took leave of our entertaining friends.

A brisk walk back to the town of Newington took but a short time, and we were ready for the good dinner which mine host of the "Newington House" had provided. There were no scientific disagreements on this excellent repast, but it was pronounced very good, and the pumpkin pie "just as good as a New England housewife could make."

We discovered in our walks that the town possessed four churches and a first-class public library (the latter without the help of Carnegie, but erected as a memorial to a worthy citizen), a cheese factory, with a bright, business-like proprietor, who informed us that the cheese was sent direct to Glasgow, Scotland; and, on sampling it, we found it very good. The business places were filled with up-to-date goods, and the post office evidently does a large mail business.

We were sheltered in the railway station during a sharp storm of rain, thunder and lightning, which had no effect on our spirits, and the evening train brought us back to Ottawa shortly after six in the evening, tired, but happy, with very pleasant memories of our Canadian peat bog.

M. McK. S.

Ottawa, Oct. 31, 1903.

The following description of the manufacture of fuel from peat has been furnished by Mr. D. B. Dowling, of the Geological Survey of Canada :

Experiments in Canada in the manufacture of peat have been carried on for many years, but were mainly unsuccessful because the attempts to drive off the moisture had been limited to mechanical means. Air drying, a long process, produces a fuel in which there is an average of 30 per cent of moisture. A quicker means of getting rid of the water is imperative, but the expense of mechanical pressure combined with other difficulties have led to the abandonment of that method. In some of the localities where the manufacture of peat fuel is going on, the process followed consists of partial drying, by first draining the bog which removes only the water which accumulates in the trenches and then partial air drying on the surface, to be followed by artificial drying by the application of heat either before or after the fashioning into bricks or bars.

Draining the bog allows of the transport of the material by portable tramways to the works and the partial drying of the surface. In wet bogs the transport is by water in barges, and when the work is on a large scale the digging is by dredges. At Beaverton the peat is dried in a rotary furnace and when in an apparently dry state pressed into bricks. The plan adopted at Newington is, for the initial stage, to dig the peat by a German machine which cuts out a vertical section by means of a box-like spade being forced down into the bed. This, on being lifted brings up with it the block cut out. The transport to the works is by means of an endless wire cable working in a trough, up which the peat is pushed by the carriers attached. It then falls into a hopper leading to the mixing machine, something like a huge sausage mill. The macerated pulp issues from the spout in long continuous bars, which are cut by hand into short bricks and transferred to cars which are then run into the heated chambers for drying. The chambers are long brick structures which, when filled with cars of peat bricks, are closed and heated by a furnace at the end, the fumes from which are forced through the chambers by a fan or steam jet. Some experience is necessary in order to judge the amount of heat and time required to bring the drying to the proper point.

The fuel so produced is not in so condensed a form as when pressed after drying, but is more of the specific gravity of hardwood and is, perhaps, in better form for kitchen ranges, as it will make a quick fire.

Newington, situated only some fifteen miles north of Cornwall, is on the edge of the watershed between the Ottawa and St. Lawrence rivers. The country passed over on the trip from Ottawa is the gently sloping surface of a marine terrace. This was built up in the bottom of the gulf that was formed when the present land surface was emerging from the sea after its burden of ice was removed by melting. The surface was probably nearly level, but in the continental uplift all parts did not attain the same elevation, so that the gentle slope north may in part be due to this cause. It is now drained by several streams, the branches of the South Nation River, and in the trip over this part glimpses were enjoyed of bits of scenery not unlike parts of the sparsely wooded plains of the West. The drainage of the surface near the channels of these streams is so nearly complete that there are not many lake basins or swamps. Near the watershed between the smaller streams and along the height of land between the major systems undrained areas are more frequent. South of the station at Newington there are depressions on what seems to be a former wave-swept face of the terrace. The surface here is more undulating and several basins are found. The lapse of time since this land emerged from the sea, several thousands of years, has allowed the complete filling by vegetable matter of the shallow lake, which is here just at the height of land.

The area and depth of this bog our short visit did not allow us to determine, but the extent seems considerable and the depth shown at parts near the southern edge is over 20 feet and farther in over 30 feet.

The submerged parts of these bogs consist of the dead and decaying portions on which flourish many growing mosses, sphagnums, and moisture-loving shrubs. Many of these peat bogs are found to be floating masses of vegetation from the bottom of which the disintegrated fibres as they lose their structure through decay slowly deposit over the bottom, layer on layer of a structureless mass of cells which form a brown material not unlike gelatine or soft celluloid. In the bog at Newington the surface does not seem to be floating but resting on the decayed mass beneath. The lack of drainage is shown in the filling up by water of trenches cut in the peat, thus allowing of the extraction of the peat from the bog only in a thoroughly saturated condition.

A VISITOR FROM THE SOUTH.

A fine specimen of the magnificent noctuid moth *Erebus odora*, Linn., was taken "at sugar" by the writer at Meech Lake, P.Q., on the 2nd August last. This is a rare insect in the Ottawa district. The species is a native of the West Indies and Mexico, but isolated specimens have been taken right across the Dominion, at St. John, N.B. (McIntosh); Montreal, Que. (Bowles); Ottawa (Fletcher); Toronto (Geddes); Orillia (Grant); Winnipeg, Man. (Hanham); Beulah, Man. (Dennis); Calgarry (Miss Moodie); Vancouver, B.C. (Bush).

Erebus odora, which bears the popular name of the Black Witch, is a strong flyer, and, as no instances are known of its breeding in Canada, all the specimens taken are supposed to have migrated from the south. It is one of the largest moths in the North American fauna, sometimes expanding nearly seven inches; the specimen here referred to is a female and measures 5⅛ inches across the wings, but a male taken by Dr. Fletcher in 1876 expands 6⅞ inches. This grand moth is figured in Comstock's "Manual for the Study of Insects" at page 297.

CHAS. H. YOUNG.

REPORT OF THE NINTH MEETING OF THE BOTANICAL BRANCH.

The meetings of the Botanical branch, which were discontinued during the summer months, have been resumed, the first having been held at the residence of Mr. W. T. Macoun, Experimental Farm, on Friday, October 23rd. There were ten present at this meeting, which was a good indication that the meetings will be well attended this winter. It was decided that instead of appointing a secretary to report the discussions for the whole season, each chairman or host should report the meetings for THE OTTAWA NATURALIST.

Dr. Wm. Saunders, who was present, exhibited some interesting specimens from the west, among which were: *Epilobium latifolium*, *Menziesia glabella*, *Rhododendron albiflorum*, *Pinus albicaulis*, and *Abies subalpina*, with its dark purple cones, from near Glacier; *Helenium autumnale*, from near Battleford; *Collomia linearis*, which is a crop pest about Saskatoon; and *Elæagnus angustifolia* from Medicine Hat. He referred to the great September snowstorm, and said that near Indian Head, although the snow fell to a depth of eighteen inches the wheat was very little injured by it. Dr. Saunders also referred to his work in originating hardy apples for Manitoba and the North-West by crossing *Pyrus baccata*, the wild Siberian crab, with the apple, and showed examples of the hybrids, which were about as large as Transcendent crabs. The flora of the Peace River was briefly touched upon by Mr. J. M. Macoun. He said that it was a surprise to him to find so few species, there being only about 200 in all. There were large areas of some species, such as *Astragalus hypoglottis* and *Hedysarum boreale.* Trees were represented by only seven species, namely two poplars, two spruces, one pine, tamarac, and one birch. While in that immense district only some 200 species of plants were found, the contrast between it and the Ottawa district was impressed on the members by Mr. Guillet's statement that he had found 28 species of plants on that little island in the Ottawa River off Bank street which is covered with water every year for a time. Among the number were six species of trees.

A discussion on the subject of thorns and spines was introduced by Mr Campbell, who had specimens of the thorns of *Gleditschia triacanthos.* There seemed a doubt as to whether this tree bore thorns or spines, but the conclusion reached was that whereas some of the younger thorns, which were really from supernumerary buds, resembled spines, not having a marked connection at first with the woody tissue, the older thorns were undoubtedly true thorns.

There was a number of interesting specimens shown by Dr. Fletcher, who referred briefly to each one of them. Among these was an interesting crab apple from British Columbia, apparently a natural hybrid between *Pyrus rivularis* and the apple, which had been sent by Mr. Orion Bowman, Upper Sumas, B.C. The fruit was larger than *rivularis*, being 1½ inches long by a little over one inch in diameter, and of better quality. *Ægopodium Podograria variegatum* which was shown is a variegated leaved plant found in many gardens, but the name of which is known by very few, as is shown by the frequent inquiries. *Matricaria inodora*, which is a weed in the Maritime Provinces, was shown by Dr. Fletcher to make a good cut flower, lasting a long time in water. He also had specimens of American mistletoe, *Arceuthobium Americanum*, parasitic on *Pinus contorta*, from British Columbia. Indian corn showing abnormal cobs among the male inflorescence or tassel. Some fine water color paintings of Manitoba wild flowers were also exhibited by Dr. Fletcher, framed in the method known as *passepartout*, which the exhibitor thought was worth bringing before the section as a very cheap and efficient way of saving such drawings and paintings as frequently come into the hands of a botanist.

The chairman read an article developing the economic aspect of Nature Study, and invited criticisms of the same. An animated discussion on the whole subject of Nature Study followed.

Prof. Macoun said that he had collected 958 species of flowering plants in the Ottawa district this year. Those present at this, the ninth meeting of the year, were Dr. Wm. Saunders, Prof. J. Macoun, Dr. J. Fletcher, Mr. A. E. Attwood, Mr. D. A. Campbell, Mr. C. Guillet, Dr. E. Blackadar, Mr. St. Jacques, Mr. J. M. Macoun and the chairman. W. T. M.

REPORT OF THE TENTH MEETING OF THE BOTANICAL BRANCH.

The second of the autumnal meetings of the Botanical Branch met at the residence of Mr. James M. Macoun, on Thursday, Nov. 5th. The members present were Messrs. Fletcher, John Macoun, Clarke, Guillet, White, Attwood, Blackadar, W. T. Macoun, St. Jacques, Campbell and J. M. Macoun.

After the minutes of the previous meeting had been read some specimens of the pepos of *Echinocystis lobata* were exhibited in which the fibrous structure was beautifully shown. The luffa of commerce is of the same order—*Cucurbitaceæ*—and the fruit of *Echinocystis*, when the cellular tissue has disappeared, resembles in miniature the towel-gourd, *Luffa Ægyptica*, the dried fruit of which is cut up and used as a flesh-brush. It is to be seen in any drug-store. The fibrous interior of these gourds is known in commerce under the various names louff, loof, loofa, lief and liff. Another species of Luffa—*L. acutangula*, the sponge-gourd—is called "the strainer-vine," from the use of the fibrous net-work contained in its fruit for straining palm-wine.

Growing plants of *Hepatica* and *Corydalis*, brought from the woods the day before, were shown by Mr. J. M. Macoun. These were about to flower, and a few days later the *Hepatica* was found in bloom by Dr. Fletcher. The occurrence of *Physalis grandiflora* only on burnt ground and never in abundance was commented on, but no explanation was suggested. Dr. Blackadar introduced the subject of the propagation of the Lombardy poplar, and in the discussion which followed it was brought out that only male specimens of the Lombardy poplar had been seen in Canada by any of those present and only female trees of the Abele poplar.

Dr. Fletcher told of the use of *Heuchera hispida*, alum-root, for the cure of diarrhœa by Indians near Rat Portage, Ont. In discussing reforestration by nature after forest fires Professor Macoun showed that in the years immediately following a fire poplar and birch making the quickest growth are most in evidence, the conifers growing more slowly not being seen ; these appear later.

The conclusion of the report of this meeting will appear in the next number of THE NATURALIST.

NATURE STUDY—No. IX.

THE PRACTICAL ASPECT OF NATURE STUDY.

By W. T. MACOUN.

It would be easy for the enthusiastic lover of nature to describe in glowing terms the wonderful beauty of a tiny flower or the marvellous markings of a crawling caterpillar, but by most persons the first would be considered an insignificant plant and the latter an ugly worm ; and, although the enthusiast might study nature with such persons for days, it is doubtful if they would ever become true nature students, unless each, of his own accord and by himself, went forth and communed with nature, and, becoming inspired by personal contact with her, seized every opportunity to glean a few grains from her inexhaustible stores. It is when the student has reached this stage that the teacher will be eagerly sought out, for, once the desire for knowledge is born, the thirst for it is intense.

It has been strongly impressed upon the writer that the permanent success of the Nature Study movement will largely depend upon the demonstration of its practical value. This is a practical age, and things useful take a very prominent place in it. I believe, therefore, that our nature studies should begin with something that it is generally conceded we should know more about, such as the economic plants which produce our daily food, as wheat, barley, oats, Indian corn, roots of various kinds and fruits ; the trees which are of greatest value for timber, furniture and other purposes ; the animals, birds and insects which are beneficial and injurious; the soil, the air, the clouds, and, in fact, everything by which we live and move and have our being. These can be studied in such a way as to show their natural beauty, their structure, their life history, and their relation one to another, and, at the same time, studied with a view to obtaining some practical result and the developing of the power of observation. Excursions to the woods need not become rarer, but there should be excursions to the farm, the orchard and garden as well. If a real interest in, and a definite knowledge of, the growth and development of a pumpkin, for instance, or of a plant of wheat, is the result of nature studies with the student, it will then be easier to create an interest in things which are not of as practical value; but much of the value of the lesson will depend on whether it promotes a spirit of investigation in the student and helps his powers of observation. Nature studies in class rooms should be with things with which the child will be sure to come in contact with through life. Be it what it may, some practical turn should be given to the study, although the arousing of interest in, and the creating a love for, the beauties and wonders of nature should always be one of the chief features of the lesson. Success in obtaining this object should be much more certain if one began with the practical and used the theoretical to aid him, than if one began with the theoretical and hoped to get something practical out of it.

The writer's main purpose in presenting this article is to show, if possible, that the amateur gardener, as a student of nature, combines the love for nature with the practical, in an almost ideal way. I do not refer to the amateur as opposed to the professional, but to the man, woman or child who grows and cares for plants mainly for the love of it; and it seems scarcely possible that one can be a true lover of nature unless, as far as his circumstances will allow, he prepares soil, sows seeds and cares for plants; for it is only in this way he can come into closest communion with nature and become best able to understand and appreciate the growth and development of the wild flowers and forest trees. From personal experience he finds that some plants succeed best in heavy soil and some in light; that some require much moisture and others comparatively little. His observation becomes keener, and he soon perceives that when growing in their native homes some species of plants will be found under certain conditions of soil and moisture, and others under different conditions. From his experience with beneficial and injurious insects, he appreciates far more than he could otherwise do, the effect these have on the growth and development of plants. He is brought into daily and closer relation with the birds and soon becomes familiar with their appearance and can identify all the commoner species.

It is a small garden, indeed, in which a robin or at least a chipping sparrow does not built its nest. Hence there is an opportunity for nearly everyone who has a garden, to study the habits of birds. On their arrival in spring their song delights him; then there is the mating and building of the nest to observe; the laying of the eggs and the habits of the birds when brooding; the hatching, feeding and rearing of the young; the vacating of the nest; and finally the flight of the fledglings. What more delightful nature studies can we have than these? And these are what will draw us to the woods, where hundreds of such bird studies await us.

The smaller animals, also, receive a share of the amateur gardener's interest and observation. A certain gardener found one morning this autumn that something had been digging holes in various places in his garden. He thought, at first, that some cat had done this, but when night after night new holes were made, he decided to investigate the matter further. He looked about carefully for footprints and found some which did not look like those of a cat. He made a still closer examination, and in one hole a faint skunk-like odor was detected. But what could a skunk be making so many holes for? It was known that he fed on chickens and sucked eggs, but there were none of these here. Did he feed on the roots of plants? What could he be after? It was decided to ask someone who knew, and then the gardener learned that the skunk—which this turned out to be—which occasionally kills chickens and eats eggs, and sometimes annoys by his penetrating odor, is really a friend of gardeners and destroys many injurious insects among which are cutworms. And, if this skunk had been killed and examined, undoubtedly some of these insects would have been found inside it. On again looking at the holes, it was found that they were much more numerous in places where the soil was sandy and warm; and all gardeners know that in sandy soil cutworms are, as a rule, most numerous. Here was a nature study which would never be forgotten, and would lead to further studies of the habits of animals in the fields and woods.

The amateur gardener's joys, which are perennial, receive an annual revival when the New Year's seed and plant catalogues come in. What pleasant hours are spent in studying the names and descriptions of plants from Abronia to Zinnia, only the lover of plants knows. And then those glorious days in spring-time when the thrill and ecstacy of life is in us and all about us! The turning of the soil and the feel of it in our hands! Even though our plants may later be destroyed by frost or cutworms, it is worth the labor just to feel that contact with the warm and steaming soil in spring. Then follows the sowing of the seeds, their germination, thinning to ensure perfect development, cultivation to conserve moisture, aerate the soil, and promote a healthy growth of the plant, the benefits of which are learned by experience and hence are never forgotten. With what expectancy he watches the developing flower buds, and when, at last, the tender petals expand, what pleasure is derived from studying the form and color of the perfect flower! .

The vegetable garden furnishes ample food for thought as well as for the table. Its economic value is only of secondary moment to the true amateur. He grows his vegetables mainly for the love of it, and hence watches his crop with quite different feelings to the man whose livelihood depends on it. There are few methods of studying nature that are at once so practical and yet so delightful as gardening, for definite knowledge of nature's methods is here obtained by personal observation, which is one great object of Nature Study.

Not only is the amateur gardener a true student of nature, but he is a public benefactor as well. His garden is a delight to all who see it. It improves the appearance of the city, town, or place in which he dwells, and even if everyone who attempts to follow his example does not catch his enthusiasm and the true spirit, he will exert a very powerful influence for good.

One of the most hopeful turns which Nature Study has taken is the establishment of school gardens, where each child. with a little garden of his own, prepares the soil, sows the seed, cares for the plant, and where he should learn more about nature from his own practical experience than could possibly be taught him by another. If his garden is in a city, or town the child will probably be more interested at first in studying the growth of ornamental plants and perhaps of fruit and vegetables, for these are what he has been brought most in contact with, and, in the teacher's effort to create a love for plants and a definite knowledge of how they grow, success will be quicker and surer if he begins with known rather than with unknown objects. In the country, where pupils are likely to become farmers or farmers' wives, special attention should be paid to economic plants, such as wheat, oats, barley, pease, corn, potatoes, grasses, and roots of various kinds, and fruit. Here Nature Study will in part take the form of elementary agriculture, although the main purpose, as elsewhere, should be to uplift the mind of the child to a nobler conception of life.

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OUR EAGLES AND OSPREYS.

Rev. C. J. YOUNG.

The eagle is a notable bird in every country, and the person who takes but little interest usually in the avi-fauna of his neighborhood, after seeing one, is very apt to say to his friend, "I saw an eagle the other day." But we must regretfully admit that this will soon be a remark of the past, so bitter is the war of extermination that is waged against these noble and comparatively harmless birds.

The bald-headed eagle (*Haliæetus leucocephalus*) is rapidly decreasing in numbers in Ontario, and the sight of a nest will be almost denied to the rising generation. The golden eagle (*Aquila chrysaetos*) has always been a rarity in this province. The former bird is occasionally observed in the winter; one or two are frequently seen in the vicinity of Kingston sailing along the shores of Lake Ontario; inland it is but rarely noticed until spring, on account of lack of food, I suppose. Up to the year 1895 two or three pairs always nested in the woods around Charleston Lake, County of Leeds, Ont.; at the present date one pair may possibly do so. One of these nests was located in a poplar tree, a most unusual building site, fixed in the limbs not more than twenty feet from the ground. The tree grew in a ravine just under the Blue Mountain which overlooks the lake. Another nest was in an oak, near Slim Bay, and which was occupied as lately as the year 1901.

The bald eagle also bred commonly along the St. Lawrence; south of Lansdowne, near Symond's Mt., a nest built in an elm being used for many years. The birds subsequently moved to a tall pine at the head of Landon's Bay, and raised their young there in safety until the tree was blown down in 1895. They have now left the locality, a locality they had been accustomed to nest in for numbers of years no doubt,—and have gone elsewhere to breed. At Wolfe Island this bird nested until recent years, occupying a large elm near Long Point, at the head of the island. When this tree blew down the eagles built a nest at the head of Simcoe Island. There they occupied a high elm, which was climbed by a man of the name of Shelbourne in 1900; a feat that very few persons would care to undertake; and the birds again changed their abode. At present there are but one or two nesting places remaining at the eastern end of Lake Ontario.

Going inland, we hear of a few pairs of bald eagles along the Rideau, and at the lakes in its vicinity; and in the latter part of summer young birds as well as a pair of old ones might be seen at Sharbot Lake almost daily. But what destruction goes on; in the spring of 1903 a pair of these eagles selected a comparatively small hemlock for a nesting station near this lake. They successfully hatched their eggs, and raised their young until they could just fly. Then the nest was found by men engaged in peeling hemlock bark; the alarm was sounded, word sent abroad, and the tree was felled, the two young ones killed and left lying on the ground, and one of the old ones shot! Such is the fate that too often overtakes these birds, nowadays.

The golden eagle nests very rarely in Ontario. A nest seen by the writer was built in high rocks at Schooner Lake in North Frontenac, and was considered for a long time inaccessible until some river drivers let one of their number down from the top of the cliff by a heavy rope, and he managed to swing himself on to the ledge where the nest was located and secure the eggs. This was towards the end of April, a few years ago, and since, the nest has been deserted. In 1903, the writer visited the place, and suggested the means by which a man named Herbert reached the nest.

As with the eagles, so it is with the ospreys. They are rapidly being exterminated. A few years ago a nest located on a pine or hemlock stub was no uncommon sight in the back country; now it is a very rare sight. This bird is more partial to the neighborhood of small inland lakes than to the larger waters and sometimes selects a tree quite away from the water The nest is almost as large as a bald eagle's, but built in a different situation. The osprey is a late breeder, the bald eagle an early breeder. The former usually lays its eggs—at least in Ontario—about May 20th, the latter about April 12th; the golden eagle about the end of April. Where not harassed and molested the two former birds are vehement in defence of their nests, and greatly resent intrusion; but I notice where they have been much disturbed, they lose spirit and do not come within gunshot of an intruder, hardly venturing to attack him if he climbs their tree.

I have not observed the osprey at Charleston Lake, or seen more than three nests in North Frontenac. One of these, in the township of Bedford, I visited with a friend on May 29th, 1903. It was built on a partially dead limb of a living maple, and is the only osprey's nest I have ever seen in a living tree. These birds were fortunate in hatching their young, which, I later learnt, they brought out in safety. But usually, as in the case of the eagles, the hue and cry is raised and the tree is either felled after the young are hatched or else the old ones are shot whilst incubating their eggs.

In some parts of North America the osprey is still fairly plentiful and is said to breed in communities, but this is not the case with our Canadian bird, which is invariably solitary, and only found in pairs widely separated. Again, in nesting, as mentioned above, the site is usually a pine, a tamarac or hemlock stub, the altitude varying from 30 to 60 feet from the ground.

In Scotland the nest was usually placed on some rocky island in a highland loch, or on a ruined tower, as at Loch Awe in Argylshire, and I believe on the coast of Maine, rocks by the sea coast or even the ground have been chosen, but not so in Ontario.

It is to be hoped these noble birds, both eagles and ospreys, may continue to enliven the beautiful lakes, and what remain of forests, in Ontario, but as matters are now proceeding, it cannot be many years before they become here, birds of the past.

PRESIDENT'S ADDRESS.

(Delivered December 15th, 1903.)

Members of the Ottawa Field-Naturalists' Club, Ladies and Gentlemen :—

Although this is but the 24th Annual Address which a president of this Club has had the opportunity to deliver, the 25th anniversary of the Club's organization will have passed before the next president has prepared the 25th Address. The Council of the Club has therefore thought it appropriate to celebrate the 25th anniversary at this time, and bring together as many of the original members as possible. While some of the first members are dead, it is pleasing to know that all of the original Council of the Club are alive; that all of them, with the exception of one, the Hon. Joseph Martin, are living in Ottawa, and that nearly all of them are here to-night.

On the 10th of March, 1879, forty men assembled in the rooms of the Literary and Scientific Society to organize a club which would promote the study of Natural History in the Ottawa district. At this meeting the club was formed and given the name of the Ottawa Field-Naturalists' Club, which it has creditably borne ever since.

The officers for that year were :—

President: Lieut.-Col. White.
Vice-Presidents: J. Fletcher, W. D. LeSueur, B.A.
Committee: W. P. Anderson, C.E., W. R. Billings, W. H. Harrington, J. Martin, H. B. Small, M.D.

The Club had a very successful season, and by the close of the year the membership had swelled to 90. This year it is 254.

On looking over the Transactions of the Club and the seventeen volumes of THE OTTAWA NATURALIST, one is impressed by the enthusiasm of the members all the way through. How few clubs, societies or associations of twenty-five years' standing can show so fine a record? There is a reason for this, however. Once a man becomes an enthusiastic student of Nature he is always an enthusiast, and we have many men of this stamp in our Club of whom we are justly proud. We know so little about

Nature, it is so easy to learn more, and there is so much to learn, that we should be poor naturalists indeed if we did not show some progress.

The following is a list in chronological order of the men who have been presidents of the Club since it was founded :

Lieut.-Col. White	1879-80
Dr. James Fletcher	1880-83
Dr. H. B. Small	1883-85
Mr. W. H. Harrington	1885-86
Prof. J. Macoun	1886-87
Mr. R. B. Whyte	1887-89
Dr. R. W. Ells	1889-92
Dr. Geo. M. Dawson	1892-95
Mr. F. T. Shutt	1895-97
Prof. E. E. Prince	1897-99
Dr. H. M. Ami	1899-1901
Dr. R. Bell	1901-1903
W. T. Macoun	1903-1904

I shall not in this address attempt to tell of the work which the Club has accomplished in past years, as others will speak more fully upon it; but as I am partly responsible for the work of the present one, it may be appropriate for me to say a few words about it.

On being elected president last March I felt that the Club might have made a much better selection, as my record of work for the Club was not very long. I appreciated the honor, however, and determined to do what I could to make the year a successful one. Everything happened to be in our favor this year New life was being stirred in the Club by the Nature Study movement which was interesting so many of the teachers and scholars in the city ; and a spring and early summer with delightful weather for excursions enticed many out to the woods and did much to make them successful. Furthermore, the Club has a capital secretary in Mr. Wilson, and he and the other members of the Council, of which the ladies form a faithful part, were always ready and willing to co-operate with me.

During the spring and summer two general excursions were held and nine sub-excursions. All of these were very enjoyable, and considerable work was done. These excursions were made as educational as possible, and particular pains were taken by the leaders of the Club to assist students and teachers, of whom there were nearly always a large number and who were most anxious to learn. Full reports of these excursions were published in THE NATURALIST from month to month throughout the summer.

During the year the Botanical and Entomological branches have held meetings at the homes of the members, the Botanical branch having had twelve meetings and the Entomological eight meetings. These have been very enjoyable and profitable to the members.

THE OTTAWA NATURALIST has maintained its high standard, and the 17th annual volume is now nearing its completion. The addition of the Nature Study department, edited by Dr. Fletcher, has done much to make our journal still more popular.

We invite your attention to the programme of soirées for this winter.

On January 5th the Rev. G. Eifrig will give a lecture entitled "The Differences and Correspondences between the Avifauna of Ottawa and the Maryland Alleghanies." This should be exceedingly interesting to Ottawa naturalists as, no doubt, Mr. Eifrig will tell us much about the winter homes of some of our summer birds.

The illustrated lecture of Dr. Barlow on January 19th, on "The Recent Landslide on the Lievre River," will be of exceptional interest as the slide occurred so recently and was of such an unusual nature. Dr. Barlow was over the ground shortly after it occurred, and has many good lantern slides to illustrate it. No less interesting will be Mr. Dowling's address on the same evening on the Newington Bog, which was visited by Mr. Dowling and other members of the Club in the autumn and of which Mr. Dowling has some good slides.

The study of the circulation or diffusion of sap in plants has engaged the attention of many scientists. On February 2nd, Mr. F. T. Shutt, who has carried on some interesting experiments at the Experimental Farm, will discuss this question. The address should be of especial value to teachers and students. On the same evening Dr. C. Guillet will read a paper entitled "Two

Springs," in which he will show how unusual the climatic conditions were this year.

All who have previously heard Dr. R. A. Daly lecture before the Club will be pleased to learn that he has consented to give an illustrated address on February 16th on "A Summer's Cruise on the Labrador Coast." The title sounds well and we feel sure that Dr. Daly will not disappoint those who go to hear him.

The last soirée, before the annual meeting, will take place on March 1st, when Dr. Sinclair will give a lecture on "Color in Nature." This address should be of interest to all naturalists, as color is what gives Nature much of her charm.

After the annual meeting, which will take place on March 15th, we shall have, on April 5th, an evening for practical demonstration of "How to Collect and Preserve Specimens," when short talks will be given while each demonstration is in progress. It is hoped that an evening of this kind will do much towards inducing the younger members to begin some work in Natural History, and to begin it in the right way.

During the winter soirées, the work done by the various branches will also be presented.

The Soirée Committee believes that it has one of the best programmes ever presented before the Ottawa Field-Naturalists' Club, and it is expected that the meetings will be well attended. Admittance is free to all the lectures, but the full privileges of the Club, including THE OTTAWA NATURALIST, which is published monthly, may only be had by becoming a member for the nominal fee of $1.

It is the desire of the President and Council of the Ottawa Field-Naturalists' Club to make the work of the Club as practical as possible, and while investigations in Natural History will continue to be the Club's main purpose there is a strong feeling that as much as possible should be done to assist those who are teaching or are about to teach the young people of this city and elsewhere to see and know and understand by means of Nature's object lessons. Already much has been done by the Club in this direction.

On behalf of the Club, I wish to express our appreciation of the grant which we annually receive from the Provincial Government to help carry on our work and which has been of such great aid to us.

Last year we lost in Dr. McCabe one who was a good friend to us. We miss him at our opening meeting where he was usually on hand to give us words of welcome. We have good cause to feel, however, that his successor, Principal White, is in close sympathy with us, and we have found him ever ready to do what he could to further the work of the Club. The fact that Mr. White has invited us to hold al our winter soirées in the Normal School is sufficient guarantee of his good will.

Members of the Club, ladies and gentlemen, I trust that we shall continue to have a successful year and that you will do your part as I hope to do mine to make it so.

MOLLUSCA.

Helicigona arbustorum in Newfoundland.

Adult living specimens of this common British and European land snail were collected by Dr. Robert Bell in the middle of July, 1885, on grassy slopes facing the sea, near the narrows of St. Johns Harbor, Newfoundland. So far as the writer is aware, this is the first time that this species has been found, in a living state, on the American side of the Atlantic. Dr. Bell says that many wrecks of vessels take place on this part of the coast, and that a little farther to the south of the locality where these snails were found, there is a small patch where the common heather (*Calluna vulgaris*) grows. This marks the spot, he adds, where an emigrant ship was stranded, and the beds of the emigrants, which were stuffed with heather, were taken ashore and emptied out.

Dr. Pilsbry has pointed out that *Helix arbustorum*, as this land snail used to be called, is the type and only known species of *Arianta*, Leach, (1831) which is now regarded as only a section of Ferussac's genus *Helicigona* (1819), and which is separated from *Helix* on purely anatomical grounds Von. Martens changed the name *Arianta* to *Arionta*, for etymological reasons, but *Arianta*, (Leach) is not the same as the *Arionta* of American authors.

J. F. WHITEAVES.

Ottawa, Dec. 4th, 1903.

MEETINGS OF BOTANICAL BRANCH.

A meeting of the Botanical Section of the Ottawa Field-Naturalists' Club was held at the residence of Mr. D. A. Campbell on Friday evening, Nov. 20th, 1903. The following members were present: Messrs. Attwood, Blackadar, Carter, Clarke, Eifrig, Leibner, W. T. Macoun, Whyte, Dr. Fletcher and Prof. Macoun.

It is gratifying to see the interest taken by the members in those fascinating problems of plant life which present themselves for solution at every outing. To the general public the plant at the flowering stage is everything. To the dilettante, those fleeting aspects of a plant's life, its color and its odor, are all-absorbing. Interesting as these may be, they are merely a few of the numerous points considered by anyone pretending to take more than a superficial view of the subject.

One of the questions discussed at the meeting was why so many plants at one stage of their season's growth produce what is called the "rosette" arrangement of leaves. Specimens of the following plants were shown: Wild pepper grass (*Lepidium apetalum*), horseweed (*Erigeron Canadensis*), common thistle (*Cnicus lanceolatus*), common mullein *Verbascum Thapsus*), spiny-leafed sow-thistle (*Sonchus asper*), ox-eye or white daisy (*Chrysanthemum leucanthemum*), common evening primrose (*Œnothera biennis*).

These plants, widely different species, exhibit a striking uniformity of plan in the arrangement of the cluster of leaves which they produce in the autumn. Each has a very short stem and many leaves arranged in whorls close to one another. In order to prevent overlapping the lower leaves have longer stalks which push their blades beyond those above them. They were collected about the 10th of November, after the blossoming season. Many plants at that season were caring most, perhaps, for the distribution of their seeds and therefore for posterity, but, in the case of these plants, and of other biennials in general, a preparation of another kind was going on with the same end in view. The rosettes were using the rays of the late autumn sun to build material for an early start the following spring. It was explained that the rosette arrangement, while not the best, on account of overlapping of the leaves, was, nevertheless, a good one, since the leaves comprising it obtained a large share of sunlight and by the close arrangement held possession of the soil.

Another topic discussed was the relation between the slope of the leaf and the type of root the plant has. In the case of the tap root, which goes deep into the soil, it is an advantage to have the leaves shed the rain toward the main axis ; in the case of fibrous root, which spreads out in all directions, it is better to have the water shed out toward the growing tips of the roots. The latter type of root is able to take the water from a larger area than the former. It is manifestly an advantage to have the water shed over this area about the centre of the plant. Of course the main business of a leaf is to place itself in the best possible relation to light, but the above incidental relation—viz., the slope of leaf to type of root—is important also. The plantain was cited as a probable exception by Mr. Attwood. Since the discussion, a number of specimens of the plantain have been examined at the Geological Survey and the roots were found to belong to an intermediate type.

A branch of a cork elm, brought from the Aylmer Road, was exhibited, and elicited the statement from Prof. Macoun that these trees are now curiously confined to fence corners and roadsides. Seeds are blown into these sheltered places where a better chance is given them to survive. This tree is one of the smaller species of elm. It has a beautiful shape but has not such slender, swinging branches as other species, owing to the disposition of cork.

Mr. Whyte referred to an elm about eighteen feet in circumference standing north-east of McKay's Lake, and advised a pilgrimage to so venerable a patriarch of the suburbs.

A discussion on the size of trees brought out the statement that larger trees grow on the western coast of the Dominion than in the east. Thus, in British Columbia there is a species of maple with leaves and top of enormous size. One of the leaves, measured by Mr. Carter, was 19½ inches by 23 inches. The diameter of the top of a tree, measured by Dr. Fletcher, was 200 feet. This large top and leaf is evidence of absence of wind storms which would play havoc with such an immense tree. The firs of the coast also present a peculiarity in that their gigantic trunks have a small bushy top and a comparatively small root system. This shows again that the wind force is slight.

The fall blooming of such spring flowers as strawberry, hepatica, and the prairie anemone, was again warmly discussed. One view advanced was that these plants, after a period of rest due to a drought some time during the summer, and having their buds ready, were forced to flower by the recurrence of spring conditions in the autumn. Mr. Eifrig stated that in Cumberland Co., Maryland, he had observed that the fall always produced such flowers no matter whether the preceding season were wet or dry.

The fact that there were no acorns in this region this year was explained by Mr. W. T. Macoun as due to the frost which occurred early in May and killed the flowers.

Mr. Clarke brought up the question of the pendent position of the pods of the locust. Prof. Macoun stated that this was characteristic of the pods of the locust family. In the cress family, however, the pods usually do not hang down but stand erect. This erect position of the pods in the cress family would facilitate the escape of the seeds from the base of the pod which opens before the top. The weight of the pod on the locust, as compared with the strength of the peduncle bearing it, may decide mechanically what position the pod assumes.

The relation of the colors of flowers to their structure was briefly discussed, demonstrating the divergence of opinion among the members on this subject.

D. A. C.

A MISPLACED RAINBOW.

The afternoon of June 2nd, 1903, was bright and pleasant at Innisfail, Alberta ; above, there was a varying number of fleecy white clouds, with a good deal of blue sky exposed between. While driving towards the town about 5.30 p.m., a strange bird-song attracted my attention, and a little observation showed that the singer was high up on the wing. On beginning to search for him, I noticed at once a most beautiful, and, to me, extraordinary rainbow, if one may use that name for a bow high in the heavens on a day when no rain had fallen. The bow was 25 or 30 degrees in diameter and was almost exactly overhead, lying perhaps 5 degrees north-west from the zenith, and there it hung, like a crown, over the earth—a complete circle, with every part brilliant and perfect. None of our party had ever heard of such a bow before, but reports have been made since then of similar phenonema having been seen in former years. It would be of much interest to know the causes of such an unusual occurrence, and any particulars as to locality and meteorological conditions attending its appearance.

W. E. S.

The killing of small birds by boys and young men has for some years been attracting the attention of bird-lovers, but it has seemed impossible to prevent or even restrict the slaughter of the little songsters, especially during the migratory season when they are most numerous. Cheap rifles and shotguns are responsible for much of the destruction as they are now in the hands of ten boys where one possessed them a few years ago. The members of the Club and all who are interested in preserving the birds and their young will learn with pleasure that, acting on representations made to him by a committee of the Club, the Hon. Frank Latchford has offered to appoint a special officer next spring whose duty it will be to see that the law is enforced. He will lay all informations and make the necessary prosecutions, but will in some degree be at the service of the Club's members in that they will be free to direct him to the districts in which the law is being broken. It is hoped that the services of this officer, aided by the activity of some of the Club's members, will do much to stop the killing of small birds and the destruction of their eggs, a scarcely less reprehensible pursuit.

NATURE STUDY—No. X.

MINERALOGY AND GEOLOGY IN SCHOOLS.

LORAN A. DEWOLFE, M.Sc.,
Teacher of Science, North Sydney Academy, N.S.

All earnest teachers will agree that Mineralogy and Geology should be taught in schools, but many feel their incompetence to teach it. To my fellow-teachers, however, I can say that ignorance of the subject need not hinder their attempting it. If you study a few rocks, and then teach what you have learned, the hearty co-operation of your pupils will aid you to surmount all difficulties. I hope to give you a few suggestions without giving material that can be found in any common text book. Supply yourself with an elementary text book, learn the general principles of geology, and start your class by giving oral lessons on what you have learned. Do not give them book facts. Take them to the brook or the beach where the bed-rock crops out in ledges or cliffs. Is it stratified or unstratified? Study its texture, hardness, durability, color, position—in fact everything you or your class can notice about it. How did it get into the position in which you now find it? What is its dip? When you learn these facts from your text book or from some friend, give them to your children, both by questioning and telling, and then request them to study some other ledge themselves and report their discoveries.

Besides the outdoor work in geology, study hand specimens of rocks and minerals in the schoolroom. After the first lesson, you will have no difficulty in securing specimens, for every pupil will bring in stones and pebbles to be named. If you cannot name them, you can study them and watch for a chance to learn the name later on.

I should begin this study with granite, both because it is common nearly everywhere, and because the origin of other rocks can be traced back to it. Give each child pieces of granite of different colors, and pieces of quartz, felspar and mica. On studying the lustre, fracture, cleavage, hardness, etc., of these specimens, the pupils will discover that the granite consists of different minerals, each resembling one of the other pieces given—quartz, felspar and mica. Are all three of these present in every piece of granite ? Which mineral gives granite its prevailing color ? When a rock is studied, I should give talks on its uses. The child will look at the next granite tombstone or wall, to see if it is the kind he had in school. He will endeavor to learn something of the methods of quarrying, cutting and polishing—in fact will take an interest in one phase of industrial life that he had not thought of before.

The use of granite as a building stone suggests marble and sandstone, which are used for similar purposes. Let us study their properties, and then their origin. Is marble harder or softer than granite ? Would it be more easily cut ? How is it affected by dilute acids ? There are certain acids in small quantities always present in the air. Decaying vegetable matter gives off *humus* acids, which, in presence of moisture, attack marble. This may be seen in old tombstones overgrown with vines, where the lettering is partly or wholly obliterated. Is marble, then, so durable as granite ? In manufacturing cities, more acid is thrown into the air than is normally present. Would it be advisable to use marble for building purposes in such cities ? Would granite be better ? Would sandstone have any advantages over either ? Is it easily affected by acids ? Is it cheaper or more easily worked than granite ? Fine-grained sandstone is better than coarse-grained, for it will not absorb so much water, which would cause chipping in the winter. Iron pyrites is injurious to sandstone, for, by weathering, it stains the stone and leaves it porous.

Now, for the origin of these stones, we shall return to granite again, and, in learning these two, we shall incidentally learn a few others. Granite, on weathering, breaks up into fragments of quartz and feldspar. The former grinds to sand, and the latter to clay. Since the clay is more finely divided, water will separate it from sand. These are washed into the sea in different layers ; finally, by pressure and cementing material, the sand becomes compressed into sandstone and the clay into shale. Through further influence of heat and pressure, the sandstone becomes quartzite, and the shale, slate. These few facts can be elaborated by the up-to-date teacher, who will probably know where beds of some of these rocks are visible. Their dip will be explained in teaching the immediate origin of granite and other eruptive rocks.

Besides these mechanical changes of granite constituents, chemical changes also take place. Felspar contains, among other things, sodium, calcium and potassium. These dissolved out furnish the salts of the ocean. The sodium furnishes the common salt, which under favorable conditions is laid down as beds of rock salt. Teach this in connection with salt mines and salt springs of the geography lesson. The calcium, united with carbonic acid, gives limestone, which in solution is washed into the sea, where sea animals use it to make their shells. These animals die, and the shells collect on the sea bottom as ooze, shell-limestone, etc., according to the kind of animal. This shell mass may re-dissolve and be re-deposited as crystalline limestone cemented by its own material. Under right conditions of heat and pressure, marble is one of the forms of limestone thus originated.

You should now have in your school collection all the rocks and minerals above named—granite, sandstone, quartzite, shale, slate, marble, coral, shell limestone, compact limestone, as well as dolomite and gypsum, which are naturally studied with limestone. Samples of sand and clay of different textures, with the rocks they came from, are necessary to teach the origin of soil.

It would be advisable, too, to make a mineral map of your province by taking a large table, marking off an outline map of the province, and covering it with rocks distributed as they are in the province itself. Mountains should be piled up with their proper rocks. Place a piece of iron ore for each iron mine, but do not place, say, hematite where limonite is mined. Indicate the locality of other minerals, mines and quarries in the same way. A glance at such a map gives the child a good understanding of the mineral wealth of his province, the association of minerals, the reason for location of centres of industry, and a knowledge of the farming lands, for the soil depends largely on the kind of rocks and their durability. On such a map do gold and coal occur in similar rocks? What about coal and limestone? What are the associate rocks of coal? Ask similar questions with reference to other minerals. The boy has learned now that rocks break up to form soils. Does he find in the field or the river-bed rocks different from those of the surrounding country? How did they get there? Perhaps from their nature it could be guessed where they probably came from, but what about the means of transportation? Here is a chance for lessons on glaciers. Show the children the parallel striation marks on exposed surfaces of bed rock. Are they equally well preserved on different kinds of rock? Compare their direction with that of lakes, hills and valleys, both in your neighborhood and on the map of Eastern North America. If the child can be shown that all harbors and river valleys have probably been gouged out by glaciers, he will know that the gouged out material had to go somewhere,—and the mystery of the gravel hills and drift boulders is, in part at least, solved. The melting of glacial ice, and its southern boundary, are very well shown in the mass of stones and gravel beaches off the New England coast, and in the comparative absence of deep harbors south of Chesapeake Bay.

Innumerable questions arise both to the teacher and the pupil, all of which furnish valuable subjects for lessons. Trace such changes as a pond filling to a swamp, a bog, and finally to a level field. This explains the formation of peat and coal. In Carboniferous rocks, fossils of vertical trees show proof of such filling. Diatomaceous earth (Tripolite), so much used for polishing powder, making dynamite, naturally suggests itself here. So does petrified wood. The next time your children walk across a bog they will have more than mischief to occupy their minds, for you have taught them to read the interesting book of Nature, whose stories have always something new.

Lack of space compels me to leave the subject here. I should like to go into the details of cave formation, growth of stalactites and stalagmites, and call attention to the varied scenery of limestone and gypsum countries. Extremely interesting to the boy, too, would be the manufacture and uses of the common metals. In connection with mineralogy, one could teach such things as the coloring of glass, the glazing of porcelain, the hardening of steel, the manufacture of paints, the making of fireworks, the making of bricks, and scores of other equally instructive facts. The flame tests and bead tests illustrate many of these points.

The teacher who will undertake this work, will find it a pleasant diversion from the more ordinary schoolroom routine. The students will search everywhere for specimens and those on the sea coast will find on ballast heaps some foreign rocks which will be useful for exchanging with teachers of neighboring districts, and in a short time the schoolroom will be adorned with a beautiful and instructive mineral collection.

[The above is an abridgment of a series of papers now being written in The Educational Review, St. John, N.B.]

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SOME CANADIAN ANTENNARIAS.—I.

By EDW. L. GREENE.

Several good species not yet described occur in that fine collection of plants which Mr. James M. Macoun brought from the Chilliwack Valley, British Columbia, in the year 1901. Excellent specimens were communicated to me two years since for determination ; and I have too long deferred that critical study of them, some ot the results of which are subjoined.

A. STENOLEPIS. Stems of pistillate plant slender, a foot high or more: basal leaves small for the plant, about 1 inch long, narrowly cuneate-obovate or -oblanceolate, acutish, scarcely mucronate, appressed-silky on both faces, most densely so beneath, the indument of the upper face less permanent, commonly lying in rolls in the old age of the leaf; cauline leaves linear and oblong-linear, very acute, erect, an inch long and just equalling the internodes: heads about 8 or 10, large, turbinate, long-pedicelled, forming a very lax cyme ; pedicels woolly but not in the least glandular or viscid ; base of involucre only very scantily woolly, the narrowly linear bracts only slightly scarious-tipped but the tips acute.

Chilliwack Valley, at 2,000 ft., 30 June, 1901, J. M. Macoun; Geol. Surv. No. 26,187. This has the habit of the rather rare Oregonian *A. pedicellata*, but as to characters of involucre it is very different. The pedicels also, in *V. pedicellata*, are glandular and very viscid, of which peculiarity there is not the faintest trace in the Chilliwack plant.

A. CALLILEPIS. Of nearly the size, and quite the slenderness of the last, the basal leaves larger by one-third and tapering to almost a petiole, green and nearly glabrous above, this face quite glabrous in age; cauline leaves spreading: cyme of 8 to 12 heads rather compact, the short slender pedicels less woolly, greenish and viscid: heads subcampanulate, much imbricated, the outermost bracts oval, the next longer but very obtuse, only the inner lance-linear, not even these very distinctly scarious-tipped, nor even the outermost notably woolly, all of a satiny light-greenish hue.

Chilliwack Valley, at 3,500 ft., 8 Aug., 1901, by Mr. Macoun, No. 26,186. Remarkable for the greenish and glossy involucres, more like those of certain Gnaphaliums than of any other Antennaria.

A. ACUMINATA. Obviously suffrutescent, but the ascending woody and naked basal branches slender and not rigid; flowering branches 9 to 12 inches high and slender; stolons also slender, long and sparsely leafy, their leaves about 1¼ to 1½ inches long, narrowly spatulate, very acute, thinnish, finely but not very densely appressed-silky on both faces; cauline leaves an inch long, erect or ascending, broad at the sessile base, but slenderly acuminate, the almost caudate tips twisted: cymes rather compact, of 6 to 12 heads; involucres greenish and lightly woolly at base, the outer and hardly scarious-tipped bracts oblong, obtuse, the next series more elongated and with broad acutish tips, the innermost series linear and acute, the scarious tips of all these deep pink and slightly incised: male plant not seen.

At 4,000 ft. in the Chilliwack Valley, 8 Aug., 1901, Mr. Macoun; No. 26,179. Only the pink involucres recall the common *A. rosea*, the long soft foliage loosely clothing the stolons, and especially the slenderly and subcaudately acuminate stem leaves mark it as very distinct. No. 26,181 of the same collection, from an altitude of 5,000 ft., I refer here, though it is a smaller plant, and at a younger stage of development, and with involucres that show but a tinge of pink. Again, No. 26,209, also from 5,000 ft., and too young, has almost rose-red bracts. All these plants show old foliage perfectly glabrous above, which is very foreign to the character of *A. rosea*, According to a collection made in southwestern Ontario, in 1901, by Prof. John Macoun, the following species occur there :

A. NEODIOICA, Greene, Pitt. iii, 184. This was obtained on Cedar Creek near Leamington, 3 June, in good condition, but only the pistillate plant. I have seen no specimens before from any point so far westward.

A. MESOCHORA, Greene, Pitt. v, 111. The type specimens of this western-midland species being from southern Michigan, and the plant being common over quite an extensive range, it was to have been expected from western Ontario lying so closely adjacent to southern Michigan ; and Mr. Macoun's numbers 26,198 and 26,199 represent well this species, the former being from Point Edward on Lake Huron, the latter near Leamington on Lake Erie.

Washington, D.C., Feby, 1904.

THE HORNED LARK.

(*Octocoris alpestris pratincola.*)

The horned lark has arrived this year, in spite of the cold and depth of snow, about its usual time in North Frontenac. Yesterday (Feb. 26th) I saw a small flock of six on the road.

Last year (1903) I first observed it on February 11th, five ; and the nest with young birds on April 20th, just hatched.

In 1902, on March 4th ; and the nest with young, just hatched, on April 17th.

There has been a large migration of pine grosbeaks this winter ; I have seen many flocks. They came early ; I first saw them on November 4th.

C. J. Y

A NIGHT'S COLLECTING FOR MOTHS AT MEECH LAKE, QUE.*

ARTHUR GIBSON.

On the invitation of Mr. C. H. Young, I paid a visit to the above charming place on the evening of the 14th of August last. Leaving Ottawa on the evening train I was met at Chelsea by Mr. Young, and after a lovely drive of half an hour or so, we reached his cottage on the west shore of Meech Lake. As it was my first visit to this delightful, uncrowded, summer resort, I enjoyed the outing immensely and only regretted that I could not spare the time to stay longer.

After we had attended to the inner man, we immediately began to arrange our poison bottles and other collecting apparatus. This done, we started out to "sugar" a number of trees, which had already been used by Mr. Young for that purpose. The term "sugar" has a special entomological meaning; the "sugar" itself is a mixture of molasses and sour beer, which is smeared on to the trunks of trees, fence posts, etc., at dusk, for the purpose of attracting moths belonging chiefly to the family Noctuidæ. Some collectors thin the molasses by adding a small quantity of rum or brandy, but the sour beer is just as good, and is cheaper. This method of collecting moths will be found to give the best results on warm, moist, cloudy nights. As soon as we had sugared about thirty trees, and placed our poison bottles in convenient pockets, we started out on the first round. When two are sugaring it is always best for one to hold the dark lantern, while the other does the bottling, or catching. Care must be taken not to direct the light too strongly, or too suddenly, upon the tree bearing the mixture; if this is done many of the moths will be frightened away. It is also well to have several good poison bottles on hand, to be used alternately after four or five specimens have been caught.

On completing our first round, we emptied our catch into a large poison bottle and were then ready to make the trip again. After having gone the rounds about five times and deposited our specimens in a safe place, we fixed up a large acetylene lamp, which we use specially for attracting night-flying moths, and proceeded up the lake about half a mile from Mr. Young's cottage. Having reached our destination, an unoccupied cottage on the slope of the mountain, we placed the lamp on the southern edge of the verandah, so that the rays would illuminate the front portion of the house The reason this cottage was decided upon was because it had been painted white, and with the light from the lamp directly along the front of the verandah from which it was reflected, much greater attraction was thus extended to insects flying in the immediate vicinity. During good evenings we have collected large numbers of specimens by this method. On the night in question we netted some very acceptable things in the couple of hours spent at this pleasant work.

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* Read at meeting of Entomological Branch, 19 January, 1903.

There is no doubt, however, that sugaring is the most productive way to collect moths. If one wants large numbers of specimens there is no reason why, in a good season, several hundred specimens could not be taken during any favorable evening. On the other hand, however, all night-flying moths will not come to sugar, but many of these may be attracted by lights. Around cities and towns, particularly in the outskirts, the electric light furnishes a splendid hunting ground for many species which one never meets with at sugar. Noctuid moths of many kinds frequent flowers in early evening attracted by the rich nectar, and while there is still natural light, specimens may be captured quite easily.

As to the specimens collected at sugar, *Noctua normaniana*, Grt., and *Trigonophora periculosa*, Gn., with its variety *v-brunneum*, Grt., were extremely plentiful and in perfect condition. Luckily, I had previously never met with either of these species at all commonly, so I took a good series of each. Some of the other very common noctuids were *Hadena dubitans*, Walk., *Feltia subgothica*, Haw., and *Noctua smithii*, Snel. The latter species could have been taken by the hundred. Every now and then one of the large *Catocala* moths would be seen eagerly sipping up the sugar. All the moths of this genus are beautiful creatures, the larger species being particularly striking in appearance. As many as six different kinds of these attractive insects were flying, viz., *Catocala* *briseis*, Edw., *unijuga*, Walk., *concumbens*, Walk., *cerogama*, Gn., *ultronia*, Hbn., and *ilia*, Cram. The latter is a new record for the Ottawa district. Only one specimen was seen and this was collected by Mr. Young. Among the more interesting species taken at sugar mention may be made of *Rhynchagrotis alternata*, Grt., *Mamestra vicinia*, Grt., *Ulolonche modesta*, Morr., *Noctua rubifera*, Grt., *Ipimorpha pleonectusa*, Grt., *Caradrina multifera*, Walk., and *Tricholita signata*, Walk. At light we netted a few nice examples of *Arctia caia*, L., var. *americana*, Harr., *Apantesis parthenice*, Kirby, *Autographa selecta*, Walk., *Achatodes zeae*, Harr., *Eueretagrotis perattenta*, Grt., some interesting varieties of *Mamestra olivacea*, Harr., as well as several other acceptable species, including some uncommon geometers. *Polystœchotes punctatus*, Fab., a well known neuropterous insect, was fairly plentiful.

The following morning we pinned our captures and I found that my share numbered over 200 specimens, all in good condition. On the afternoon of the 15th we took a tramp up the mountain towards Kingsmere, our object being chiefly to collect larvæ. As the late Dr. Riley said: "The careful entomologist who prides himself on the appearance of his specimens, will rely largely on collecting the early stages and on rearing the insects, for his material." Our chief plan for collecting larvæ was by beating the foliage, holding in one hand a beating net so as to catch any larvæ which might fall. In this way we collected caterpillars of *Schizura ipomœae*, Dbl., *Pyrrhia umbra*, Hufn., *Automeris io*, Fab. (from basswood), *Heterocampa manteo*, Dbl., *Autographa biloba*, Steph., etc. Feeding within the stems of the common dock, *Rumex occidentalis*, S. Wats., we found nearly full grown larvæ of *Papaipema cerussata*, G. & R., the mature insect of which is a very beautiful moth of a rich brown color with purplish and reddish areas and conspicuous whitish spots on the fore-wings. An interesting form of this species, which lacked the white spots on the primaries, was reared by Mr. Young.

The Raspberry Clearwing, *Bembecia marginata*, Harr., seemed to be very plentiful, as I secured, from differents plants, six specimens within half an hour. These little wasp-like moths delight in exposing themselves to the full heat of the sun, being found resting on the upper surface of the leaves. The larvæ are often very destructive, and as little can be done to prevent the damage, canes infested invariably die.

Meech Lake is a most interesting locality from an entomological standpoint. Mr. Young during his two summers' sojourn there, has collected many insects new to the Ottawa district. Doubtless others also will find the place a most profitable one to explore.

CELEBRATION OF THE TWENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE OTTAWA FIELD-NATURALISTS' CLUB.

(Ottawa Field-Naturalists' Club founded March 22nd, 1879.)

The first of this year's soirées was held in the Normal School Hall on December 15th, 1903. In place of the usual conversazione it was thought best to celebrate at that time the 25th anniversary of the organization of the Club, and to bring together as many of the original members as possible. A very enjoyable time was spent at this meeting in recalling interesting facts relating to the early years of the Club.

The Principal of the Normal School, Mr. J. F. White, gave an address of welcome, in which he spoke of his appreciation of the work the Club was doing and of the assistance being rendered to students of the Normal School by its members. The President's address, which was published in the February number of THE NATURALIST, followed, after which five members of the original Council of the Club made short addresses. The first President of the Club, Lieut.-Col. W. White, C.M.G., spoke on "The Study of Natural History at Ottawa before the formation of the Club." The following is part of what he said : "When, in 1865, the seat of government was transferred from Quebec to Ottawa those of us who had been members of the Natural History Society of Quebec were most agreeably surprised to find that in the new Capital there was not only a Mechanics' Institute, with the nucleus of a museum, but also a Natural History Society in good working order with a number of very active members, amongst whom may be mentioned Dr., now Sir James Grant, Professor Webster, the Rev. T. D. Phillips, Dr. Van Courtlandt, Mr. James

Ogilvy, Mr. Rowan and Dr. McGillivray, and in those days activity was very active." Among the expeditions participated in by Col. White were a visit to the cave at Pelissier's, a visit to East Templeton to inspect plumbago and a tramp through the mica districts in the Gatineau hills.

Mr. R. B. Whyte's subject was "Botanical conditions around Ottawa twenty-five years ago." He said that there had been great changes in the collecting grounds during that period. Houses were now standing where good botanizing grounds used to be. Twenty-five years ago there was a small bog in the woods in the neighborhood of Beechwood cemetery in which he found *Cypripedium spectabile*, *Sarracenia purpurea* and *Ledum latifolium*, plants which have long disappeared from that vicinity. The pitcher plant was also found at that time near the old race course along the Bank street road.

Dr. Fletcher spoke of "Ottawa as a Natural History locality twenty-five years ago." He mentioned the old localities where the rarer specimens used to be collected, and said that the rapid growth of the city had destroyed some of the best of these. He stated that there was abundant opportunity for doing good work still, and good localities within easy reach of the city. He referred to the great aid the Geological Survey staff had been to the study of Natural History in the Ottawa district.

Lieut.-Col. Anderson's address related to "The workers in Natural History at Ottawa twenty-five years ago." He said that Dr. James Fletcher had most to do in suggesting and organizing the Ottawa Field-Naturalists' Club, and had been one of the most energetic workers from the beginning. Others who did good work in the early years were Mr. W. H. Harrington, Mr. R. B. Whyte, Dr. H. B. Small, Mr. Walter Billings, Hon. Frank Latchford and Mr. W. L. Scott.

Dr. H. B. Small, in speaking of "What the Ottawa Field-Naturalists' Club had accomplished," gave incidents of the early years of the Club. He brought with him dried specimens of plants collected twenty-five years ago, and said that each plant recalled the place where it had been obtained and other incidents connected with it, and took him back to the time when he was actively engaged in work for the Club He considered that the Club had done splendid work in studying the Natural History of the district. The results of the labors of the members were contained in the printed transactions of the Club and the volumes of THE OTTAWA NATURALIST. The Club had, during the past twenty-five years, given thousands of Ottawa's citizens pleasant outings in the country, where those who loved Nature had splendid opportunities for study.

Short speeches were also made by Dr. Robert Bell, the Director of the Geological Survey, and Prof. J. Macoun. A vote of thanks was proposed by Mr. W. H. Harrington and seconded by Mr James Ballantyne.

W. T. M.

SOIRÉES.

At the meeting of the Club held in the Normal School January 5th, the Rev. C. Eifrig lectured on "The Differences and Correspondences between the Avi-fauna of Ottawa and the Maryland Alleghanies." The speaker endeavored to show that, although the region under discussion is six to seven hundred miles south of Ottawa, there are not only marked differences in the status of the ornis of Ottawa and the Maryland Alleghanies, but also many and surprising correspondences. This production of suitable conditions for birds, as well as plants, of otherwise widely distant regions, is brought about by the great differences in altitude in that section. And while it is well known that among the high peaks of the Rocky Mountains all the different conditions and areas of floral and faunal life, from the tropic to the arctic, may be found close together, it seems surprising that somewhat similar conditions should exist in the much lesser altitudes of the Appalachian Mountains. The valleys in the westernmost part of Maryland, which are crossed by the Alleghanies, are from 500 to 1,000 feet above tidewater and are in the Carolinian life zone. This is where the differences between here and there come in. The Carolinian belt of the Austral or southern life zone is characterized by such birds as the cardinal (*Cardinalis cardinalis*), tufted titmouse (*Parus bicolor*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Parus carolinensis*) and others being permanent residents there. The bluebird (*Sialia sialis*) also is found there all winter. Higher up, in an altitude of from 1,500 to 2,500 feet, especially on the northern slopes of mountains, we find the animals and plants of the higher and lower transition belts of the Austral life zone, characterized by an overlapping of northern and southern species. In the highest elevations in that section, along the backs of the highest mountains, notably in the primeval hemlock and spruce stands and in the sphagnum and cranberry swamps, in an altitude of from 2,500 to 3,400 feet, the highesr attained in this section, we find many Canadian and boreal species of both fauna and flora. This is where the correspondences between here and there comes in. Of Canadian mammals, *e.g.*, we find there the Canadian white-footed mouse (*Peromyscus canadensis*), redbacked mouse (*Evotomys gapperi*), jerboa (*Zapus hudsonius*), varying hare (*Lepus americanus* v.) etc., found only in these boreal islands. Of Canadian birds we find breeding there the Canadian warbler (*Wilsonia canadensis*), the magnolia warbler (*Dendroica maculosa*), redbreasted nuthatch (*Sitta canadensis*), hermit thrush (*Hylocichla guttala pallasii*), solitary vireo (*V. solitarius*), raven (*Corvus corax principalis*), etc. The plants showing that here Canadian conditions of climate, etc., must exist are, *e.g.*, black spruce (*Picca mariana*), tamarac (*Larix americana*), yew (*Taxus minor*), moose-wood (*Dirca palustris*), cranberry (*Vaccinium macrocarpon*) and many others. Altogether this is a very beautiful and extremely interesting part of North America.

Before an attentive and appreciative audience of Field-Naturalists and their friends, in the Normal School, on the evening of the 9th February, Mr. Frank T. Shutt, M.A., Chemist of the Dominion Experimental Farms, gave a lecture on sap and sap movement, which was academic both as to substance and form. The display of charts, used to make clear difficult points, reminded one of University halls.

After explaining that the term "circulation" was inappropriate as applied to sap movement, the lecturer described the various anatomical structures through which the movement took place, viz., the root-hairs, where the water enters; the deeper tissues, the fibro-vascular bundles of root and stem, through which the water ascends; the veins of the leaf, along which it proceeds to the intercellular spaces, at the exit of which stand the guard cells of the stomata.

It was pointed out that sap is a dilute solution of food, partly of a mineral nature, taken from the soil, partly of an organic nature, derived from carbonic acid absorbed by the leaves from the atmosphere. The chief mineral constituents are phosphates, silicates and nitrates of potassium and calcium. The chief organic constituents are sugar, soluble proteids and organic acids, with sometimes coloring matters. These are conveyed or carried about in the water, which has the double function of dissolving and distributing this food material. An enormous amount of water takes part in these two processes. Besides the above uses of the water, it is itself food material, and also serves to render the plant turgid, thereby enabling succulent plants to stand erect. The proportion of water in plant tissues is very large, from 40% to 90%, but the amount of water so represented is very small compared with that which passes through the plant or tree and is lost by transportation. For every pound of dry matter stored up in the tissues between 300 and 400 pounds of water pass out into the atmosphere by the stomata.

The causes of the upward movement of sap were next dealt with. The water enters the root-hair from the soil by osmosis. This osmotic action may be experimentally illustrated by placing a strong sugar solution in a glass cylinder (lamp glass), one end of which is covered by a bladder, and suspending the cylinder in water. To eliminate purely hydrostatic action which might produce movement, have the level of water inside the bladder the same as that without. In a short time the level inside rises, showing that, if an interchange is taking place, more water is entering, than escaping from, the bladder. Some sugar makes its way to the outside liquid. Thus, on purely physical grounds, one may see how water enters the root-hairs of plants. Having entered, it filters through to the deeper cells, and, in the case of the higher plants, ascends chiefly by means of the Xylem elements of the fibro-vascular bandles. This ascent is aided by osmotic attraction due to transpiration at the leaf above, and also by "root-pressure" from below. Mr. Shutt stated that root-pressure was not well understood, that it could not be accounted for on physical grounds alone, and that we must assume that the vital activity of the cell plays an important part in the rise of the sap.

The flow of sap in the maple was then discussed in detail. For many of the facts upon which he based his statements, Mr. Shutt said he was indebted to Bulletin 103 of the Vermont Agricultural Experiment Station, copies of which, to a limited extent, the Director of that Station had kindly placed at his disposal for distribution among the members of the Club. At the Vermont Station it was established that pressure and flow went hand in hand. Pressure is a cause of the flow, but not the sole cause. Cold nights followed by warm days make the ideal sugar weather. Uniform temperatures, whether high or low, do not favor a flow of sap. The higher temperature, following cold nights, seems to excite the protoplasm to activity. The root-hairs absorb water, and since there is no transpiration, as the buds have not opened, the water accumulates in the tree, setting up a high pressure. Pressure is further increased by the expansion of the gases in the tree due to the rise in temperature. Tapping the tree relieves this pressure. The water, in escaping, carries out with it in solution the sugar which was stored from the previous season in the tissues of the sap-wood. The direction of the movement is principally through the Xylem vessels and downward through the phloem elements, but it is also in every direction, more or less, depending upon pressures, and these again chiefly on changing temperatures. In summer the movement is generally upwards.

The lecturer closed his interesting address by pointing out the utility of a knowledge of plant physiology. To instance but one of several illustrations, he gave his studies and experiments on apple twigs, which showed him that the greater the water-content of the twigs the less hardy they were. This being true, it is obviously advantageous to reduce, if possible, the amount of water in the tree, at the close of the summer, to enable it to withstand the severe conditions of a winter season. Cultivation of the soil of an orchard should not, therefore, be continued in the autumn. A "cover" crop, sown in July, withdrew the moisture from the soil at that season when the wood was ripening and also served other useful purposes.

The stimulating nature of the lecture was shown at the close by a volley of questions from the members present, and a vote of thanks was heartily endorsed by the audience.

D. A. C.

MEETINGS OF BOTANICAL BRANCH.

A meeting of the botanical section was held at the home of Prof. Macoun, December 10th, 1903. The subject of the evening was "Weeds and the causes that lead to their dispersion." Prof. Macoun introduced the subject by remarking that our weeds were "Aliens" and not "Natives," and remarked that on one occasion while showing an eminent English botanist around the city and its suburbs, the visitor remarked that there was a wonderful similarity between Canadian plants and those of England. He was very much surprised when told that all he saw were aliens and he must go to the woods to see the native plants.

Prof. Macoun further developed his subject by showing that Canadian plants, native at Ottawa, were necessarily incapable of occupying our roadsides and cultivated fields, and hence in the struggle for existence in the open they had no chance with the immigrants. Numerous illustrations were brought forward in support of this, then seed dispersion was taken up and a warm and interesting discussion took place, which was joined in by nearly all present. Dr. Guillet brought up the subject of "Sheep Burrs," to illustrate the methods adopted by various species to assist in the dispersion of their seed, and other members supported his views by many apt illustrations which showed that most of the members held his opinions. After a very animated discussion, Prof. Macoun, as chairman of the meeting, said that while admitting the ability of burrs and seeds of like nature to be dispersed by this method, he denied their necessity and disputed their utility. He showed that the sheep burr had not a general distribution, that it was largely a roadside plant, was hardly ever found in fields, and in fact, was very limited in its distribution.

The burdock and "beggar ticks" were of the same character and were also limited in their distribution. As a contrast to this Prof. Macoun mentioned the mustard family as a weed producer and showed that this order had no special means of dispersing its seeds, and yet the worst weeds we had belonged to this family. Another animated discussion took place and the conclusion was reached that the *Cruciferæ* produced great numbers of small seeds that could lie in the ground for years, and germinate just when the right conditions existed. It was shown by Mr. Hamilton that seeds ot *Polygonum* must have lain in the soil in Montreal for at least 30 years. Earth which had been thrown out when making a drain produced a full crop, although for 30 years it had been covered by a building. Dr. Fletcher mentioned the case of *Thlaspi arvense* in Manitoba, which appears just when it is suited with the conditions and when its chances are poor it disappers.

Many side issues were introduced and discussed, and the general opinion was reached that weeds like the house sparrows had been battling for centuries against all manner of adverse circumstances, and on this account were better able to succeed in the battle of life than our native plants, which never had any trouble to overcome, hence when their environment is disturbed they fade and die and only live in the memory of woodland dreamers. Amongst other subjects discussed was the modes of dispersal of *Nasturtium officinale*, and it was decided that seeds were only secondary in this. This led to talk of other members of the same genus and Dr. Fletcher cited *N. lacustre*, which formed little rosettes in the autumn. Another member mentioned the bladder wort, and explained how the extreme tips of the stems fell into the mud after the first frost and became the new plants the next season. In a few words Prof. Macoun showed that nature never failed in its work, that when the seeds could not ripen they formed buds or bulblets, that the tips of many plants ceased to grow in the late summer and the plant stored up in them concentrated food. These tips sank to the bottom of stream or pond and became the new plant in the spring.

Colds, absence from the town, prior engagements, etc., made the attendance very slim at the meeting of the Botanical section of the Field-Naturalists' Club held at Mr. Guillet's house, 8 First avenue, on the 28th January. Only the following attended: Dr. Blackadar and Messrs. Whyte, Campbell, Attwood and St. Jacques. Mr. Whyte brought a great package of beautifully illustrated works on plants and gardening. From these and a few others Mr. Attwood made a bibliography which will be published in THE NATURALIST. The opinion was expressed that popular works on botany are of little use to any earnest student, as they take him but a little way and then leave him to grope as blindly as at the beginning, simply because they are not systematic or comprehensive, but give mere scraps of information. The proper way to learn plants is to get a systematic work on classification, a good handbook such as Gray's or Britton's, and then begin at once to make a herbarium, pressing and classifying one's plants as one learns them. Ten plants clearly mastered in this way are worth a hundred hazily named with the aid of Mrs. Dana's pictures of flowers or Mr. Matthew's pictures of leaves.

Mr. Guillet showed the members two charming works on the natural history of two regions of South America, namely, H. W. Bates' "The Naturalist on the River Amazons," 1863, and W. H. Hudson's "The Naturalist in La Plata," 1895. There are several other excellent works similarly named, viz., Belt's "The Naturalist in Nicaragua," 1874, and W. Saville-Kent's "The Naturalist in Australia," 1897. Darwin's "A Naturalist's Voyage Around the World," 1845, might also be mentioned, as well as Wallace's "The Malay Archipelago," 1868. Who will write a book worthy to rank with these and entitle it "The Naturalist in Canada"? Seton-Thompson might have done it, had he not, like Grant Allan, turned aside to work doubtless more remunerative, but certainly less solid, worthy and permanently interesting.

Before reading his paper, the convener made a few remarks concerning the conduct of such a little club within a club as is the Botanical section. He thought that as far as possible the topics of each meeting should be announced beforehand for the sake especially of the more inexperienced members, who would have a chance to prepare to discuss or at least to listen the more intelligently. He also thought it would not be out of place for the section now and again to resolve itself into a seminary for the hearing and criticism of one of the papers in preparation for the public soirées of the Club; that such papers might be made more truly representative of the best the Club had been able to do during the year. The convener then read his paper on "The Relationship between the Weather and Plant-growth," and received several helpful criticisms from the members.

While the members were discussing some Northern Spies from the convener's native county of Northumberland—the finest apple-growing district in the world—he showed them some views illustrating the natural history and other out-of-doors work done by his pupils.

Several interesting botanical and zoölogical specimens were shown, most of which, on account of the absence of Prof. Macoun and Dr. Fletcher, had to remain unidentified. Mr. Campbell had a pretty mounted specimen of the shed skin of a frog's foot. An hepatica was shown just coming into bloom. Two of Mr. Guillet's pupils have succeded in getting hepaticas, and one, Spring Beauties to bloom in the house this winter.

On account of the absence of the above-named members, the topic "Protective Color Changes in Animals" was left over for another meeting, as these gentlemen were expected to contribute original observations on the subject, and Mr. Guillet had only the observations of others—especially Pouchet and Biedermann—to offer.

MEETINGS OF ENTOMOLOGICAL BRANCH.

Meeting No. 5 was held on March 12th, 1903, at Mr. Harrington's; eight members present. Dr. Fletcher said that he had forwarded to Mr. Needham a drawing of the dragon-fly nymph-case shown at the previous meeting by Mr. Halkett, and that it proved to be that of *Hagenius brevistylus*, not previously recorded from so far north as Spanish River. Mr. Halkett showed a water-bug (*Corixa* sp.) which had been received with whitefish eggs from Selkirk, Man., and stated he had seen these water-bugs in immense numbers when visiting the hatchery there. Mr. Richard showed some butterflies, including *Pamphilus manitoba*, from Isle Verte, Que.; *Grapta gracilis*, from Langevin, Que., and *Argynnis cybele*, *A. atlantis* and *A. aphrodite*. Dr. Fletcher pointed out how these species could be distinguished, and discussed their range. Mr. Gibson and Mr. Metcalfe also spoke of the abundance of the last named at Toronto. Dr. Fletcher read a note on *Deilephila galii*, and made some useful observations on incorrect terminations of specific names. He also spoke of the so-called rarity of insects, pointing out that, while there are certain species which seem actually to be rare wherever they occur, the majority of so-called rarities are taken in abundance when what may be called the metropolis of the species has been found. He instanced *Liparocephalus brevipennis* and *Ægialites debilis*, beetles of which only a few specimens had been known until Rev. J. H. Keen had taken them abundantly; the first at Masset, Q. C. Islands, and the second at Metlakatlah, B.C., where he had carefully studied its habits. Mr. Harrington exhibited specimens of *Blastophaga psenes*, a curious little Chalcid wasp which pollinates the Smyrna figs, and read a note on the efforts made by the fig-growers of California to establish this insect in their orchards, so that the quality of their figs might be improved.

Meeting No. 6 was held at Dr. Fletcher's on March 26th, 1903; four members present. Mr. Metcalfe exhibited a fine series of four species of Argynnis, and mentioned the great abundance of *A. cybele* at Grimsby upon flowers of Teazle (*Dipsacus*), to which also three species of day hawk-moths were attracted. Dr. Fletcher exhibited, as representatives of the Satyridæ, which had been discussed at a previous meeting, a collection of very fine Morphos, and made some remarks on the flight and habits of certain species of these large and brilliant butterflies. He also showed a Denton tablet mount of the magnificent *M. cupris*, and similar mounts of *Gonepteryx mærula*, *Callidryas lurina*, *Papilio troilus* and *Parnassius apollo*. Mr. Harrington reported on the progress he had made in rearranging his Ottawa coleoptera and showed the last case prepared, containing about 75 species, commencing with Tricopterygidæ and ending with Cucujidæ, many of the smaller species being yet undetermined. Some discussion followed upon

Coccinellidæ; Mr. Metcalfe instancing the occurrence of *Megilla maculata*, at Grimsby, upon dandelions in such numbers as to give the flowers a pink appearance. Dr. Fletcher said the beetle had been abundant in 1902 upon corn in his garden. He then read a letter from Mr. J. W. Cockle, of Kalso, B.C , enclosing a list of over 600 species of moths collected by him at that point, and including many new and rare species. An interesting paper was received from Mr. Wickham, entitled "The Beetles of an Oregon Sea-beach."

Meeting No. 7 was held at Mr. Harrington's on April 9th, 1903: six members present. Mr. Metcalfe exhibited a box of coleoptera from Grimsby, Toronto and Port Hope, including many interesting species, such as *Carabus sylvosus*, *Notiophilus æneus*, *Hister militaris*, *Ryssodes exaratus*, *Phymatora pulchella*, *Corymbites virens*, etc. Dr. Fletcher read a paper, newly received from Dr. Scudder, on "Hunting for Fossil Insects," the account of a trip to the celebrated Florissant beds. After some discussion of the occurrence of fossil insects in Canada, and on some of the insects which had been already noted this spring, Dr. Fletcher gave, incidentally, the description of a visit to a heronry in the Moose Mts., Man., the herons being locally known as fish-ducks. The question was considered of special lines of work for the collecting season and the members selected as follows: Halkett, aquatic insects; Gibson, basswood insects and arctians; Metcalfe, hemiptera; Richard, butterflies; Harrington, spruce insects and saw-flies; Fletcher, Geometridæ, Plusiidæ and dragon-flies, with special attention to the life-histories of insects. Mr. Harrington showed 65 species of insects which he had obtained from a little moss collected in the swamp on the Experimental Farm near the canal.

Meeting No. 8 was held at Mr. Halkett's on April 23rd, 1903; six members present. Mr. Gibson and Mr. Halkett exhibited insects taken at the Club excursion to Blueberry Point, Aylmer, on the previous Saturday; among these were *Cychrus lecontei* and *Aphorista vittata*. Mr. Halkett also spoke of the mosquito larvæ he had there collected. Mr. Richard showed some beetles recently captured, including three specimens of an undetermined elater.

The species had been taken at the same locality near Rockcliffe by Mr. Harrington in April, 1883. Mr. Gibson read a paper on "Hunting for Caterpillars," describing their hiding places and traps that can be placed for them. Dr. Fletcher exhibited root-galls, from a Japanese rose in his garden, produced by *Tribalia rufigaster.* The galls had been so abundant as to seriously injure the bushes. Our native roses are also subject to the same infestation. Mr. Harrington mentioned that he had sent similar galls some years ago to Mr. Ashmead, who had expressed his pleasure at ascertaining the food-plant of this gall-fly. Dr. Fletcher read an article by Capt. Brown of Auckland, N. Z., on "The Wharf Borer," which had caused serious loss in Auckland by the depredations of the larvæ in paving blocks and wharf timbers. The insect in question, *Nacerdes melanura,* has been found in Ottawa, but is more abundant in seaports. Mr. Harrington showed a series taken by Prof. Macoun on Sable Island, and also examples of all the other Œdemeridæ known to occur in Canada.

Meeting No. 9 was held at Dr. Fletcher's on May 7th, 1903; eight members present. Mr. Harrington showed some beetles, including *Anisodactylus sericeus,* new to Ottawa and not on the lists of the Ontario Entomolgical Society, and a Platynus taken at Aylmer and apparently not previously found at Ottawa. Mr. Metcalfe exhibited specimens of *Emphytus cinctus,* a rose-saw-fly, which he had found common in Mr. Scrim's rosehouses on April 26th. Dr. Fletcher spoke on a fine series of the hitherto very rare beetle *Ægialites debelis* received from Rev. J. H. Keen of Metlakatlah, B.C. Mr. Metcalfe exhibited beetles and hemiptera recently captured, including *Eurymycter fasciatus, Mysia pullata, Donacia æqualis,* etc. Mr. Halkett showed a living larva of *Hydrophilus triangularis* and pupæ and imago of mosquito from larvæ collected at Aylmer excursion. Dr. Fletcher showed *Orthesia insignis,* or white-fly, from greenhouses; also *Bruchus rufimanus,* the bean-weevil, and explained the difference in habits of this species and of *B. pisi,* the pea-weevil. The latter lives singly in the peas and does not attack the dry or stored seeds, while the former attacks dried beans and several may infest one bean, and it also infests seeds of tares. The larvæ of the pea-moth attack the seeds externally, being thus easily recognized. Mr. W. T. Macoun showed specimens of the pea-weevil from peas grown on the Experimental Farm, and said only one variety appeared to be attacked. Dr. Fletcher exhibited eggs of the rare moth *Apocheima rachelæ*, and a male imago. The female he said was wingless. He showed, also, examples of a rare moth (*Leucobrephos*) which had been taken by Mr. Hanham and Mr. Criddle. He suggested *Colias philodice* as a desirable species for any person wishing to make a start at breeding lepidoptera; the food-plant, clover, being easily obtained and the butterfly passing through all its stages within a month. Mr. Gibson showed several species of lepidoptera.

Meeting No. 10 was held at Mr. Harrington's on June 10th, 1903; seven present. Mr. Gibson showed a female of *Hypantria textor* mounted as in the act of ovipositing, with egg-mass on leaf; also examples of *Phragmetobia rubicosa* bred from larvæ exhibited at meeting No. 8. Dr. Fletcher made the following exhibits: *Lixus concavus* from Harrietsville, Ont., in which district the beetle has been found boring in the stalks of rhubarb; *Apocheima rachelæ*, male, female and inflated larva; blackberry canes, covered with and killed by, the scale-insect, *Lecanium Fitchii*, whose habits were outlined; three species of horse-flies (*Tabanus*). He mentioned that, at the sub-excursion on the previous Saturday to Leamy's Lake, *Podisus modestus* had been observed feeding upon canker-worms, which were abundant, and that the beetles of *Hoplia trifasciata* were numerous on viburnums of two species. Mr. Metcalfe showed three boxes of hemiptera recently collected and including, apparently, some forms not before observed from Ottawa. Mr. Richard exhibited some lepidoptera, among which were *Platypteryx arcuata*, *Nisoniades juvenalis*, and *N. icelus*. Mr. Halkett showed a wasp's paper nest, and nymphs of some species of dragon-flies. Mr. Harrington showed several of the large pear-shaped cocoons of the spider *Argiope riparia*, which had been found in the tops of spiræa in the Beaver Meadow at Hull. He also showed two boxes, chiefly hymenoptera, diptera and coleoptera, collected recently, and pointed out several species which appeared to be new to our collections. Among these was a handsome Chrysops, the flies of which genus are very aggressive and are generally known as deer-flies. An interesting beetle was a female *Monohammus scutellatus*, a species of pine-borer, having an extra front leg.

NATURE STUDY—No. XI.

NATURE STUDY AND RURAL EDUCATION.

J. W. HOTSON, M.A., Principal, Macdonald Consolidated School,
Guelph, Ont.

Few things are of more vital importance in moulding the destiny of a nation than the system of education in its rural districts. The most progressive nations of to-day have recognized this fact, and are making strenuous efforts to raise the standard of efficiency in rural education. Canadians, perhaps, more than any others, should not be slow in recognizing the importance of this phase of education, or in availing themselves of improvement in it. The geographical position, the climate, the vast prairies of the West, make Canada's greatest industry essentially agricultural. Nearly seventy-five per cent. of her population live in the country and are educated in rural schools The greatness, the stability, the very backbone of this nation is its rural population. More than ever before, the future of this country depends upon its public schools. Since this is true, how important it is that the education of the rising generation of this great nation should be carefully and jealously guarded ! I have great faith in the rural school, in its power to mould and build up a national character ; but new educational methods must be employed before we can hope for the best results.

The public school system of to-day is a product of the university. "The greatest achievement of modern education," says Payne, "is the gradation and correlation of schools whereby the ladder of learning is let down from the university to the secondary schools and from there to the schools of the people." If this be true, it is no wonder that the present system of education has failed to produce the best results in the lives of the boys and girls of the country. Our educational system tends to lead to professions rather than to the farm. City things have been taught rather than country things, and, by ignoring the farm and the farm home, our greatest industry, farming, and our best institution, the farm home, have been discredited. Our modest farm homes stand as our greatest bulwark. Guard them !

If education is a preparation for real life, and I believe it should be, and seventy-five per cent. of our population are in the rural districts, depending directly on the soil and its products, and if we believe in the principle of "the greatest good to the greatest number," then, rural education should be a preparation, at least in some degree, for life on the farm. It should lead the child into a more sympathetic relation to his daily life "to the end that his life may be stronger and more resourceful." This does not mean that these schools should teach only the art of cultivating the soil. Rural education should be broadened not narrowed. It cannot be broadened by teaching agriculture only; boys and girls must have a knowledge of language, history, mathematics, etc. Language is a mind tool; the hoe a hand tool. Training in the use of either may be education; but, for best results, they must go together.

In order to develop the trained hand and cultivated mind, more emphasis should be laid on the method of acquiring the information than on the information itself. Mere facts, however important, are not all of education—they are of secondary consideration. How the child acquires those facts, is of vastly more consequence from a pedagogical point of view. The pupil should, as far as possible, be led to rely upon his own resources. He should be led to investigate problems for himself and thus acquire his knowledge first hand. It is the thinking man, "the reasoning and the reasonable man," that makes "the good citizen and the honest neighbor"; so it is the child that is taught to see things as they really are, and to think for himself regarding the things he sees, and is thus led to draw correct conclusions from what he sees, that makes "the reasoning and the reasonable man," "the good citizen and the honest neighbor." In training the eye to see, the ear to hear, and the mind to perceive, we have done much to aid the child in understanding the more complex things in real life. It may not be true "that only those things are useful which one finds out for himself," but no one will deny that from the ideal as well as from the economic point of view of education, those things are of most use which one finds out for himself. But the world is too wide and life too short to turn a child out by himself and expect him to come, unaided, to even a fair understanding of the mysteries of nature; yet, give him a wise and careful instructor, and he may be led to see how nature solves her problems and thus be better prepared to solve those problems of life which confront everybody, and which each individual must solve for himself

Is all being done that can be done to improve rural education? I fear not. It is certainly gratifying to know that the educational authorities in most of the provinces have recognized the necessity of doing something to improve it. Never before in the history of Canada have the prospects looked so bright for an honest effort on the part of the best educators to solve this problem. The solution lies, it seems to me, in the proper presentation of Nature Study, or rather that phase of Nature Study that will tend towards agriculture. This can be presented to the best advantage by establishing a school garden in connection with each school. Nature Study and the School Garden are inseparable if we wish the best results. This does not mean that technical agriculture is to be taught, far from it. Nothing would be more disastrous to the cause of rural education than to attempt to teach technical agriculture or technical science in the public school. We have agricultural colleges and high schools for that purpose. Nature Study in our public schools would interest the children in the common every-day things about them; in things they have been seeing all their lives, yet not perceiving; in the songs of birds and insects they have been hearing, yet not appreciating. They would find themselves in a new world, or rather in their old world made new, by a living, loving sympathy and interest in everything about them. Their eyes would be trained to observe, their ears to hear, and their minds to seek the truth for the truth's sake, and in seeing, in hearing, and in seeking for truth, they would be trained to draw right conclusions from what they see and hear.

During the first five or six years of a child's existence he has created for himself a little world. He has attempted to solve many knotty problems. In fact, he has been on a tour of original research, as truly as the best investigator along the line of science, and no one will deny that in many cases he has been more original. He has started out along the right line to make himself "the good citizen and the honest neighbor," and to acquire those things that go to make up a "successful life." Why not continue these experiences in the school? Why not begin to build on what he already knows, rather than thrust him, as is too frequently the case, into a new and strange world—the school—a world in which he searches in vain to find something to link with his past? Alas! he finds himself as totally amidst new surroundings as if he had been suddenly set down in a foreign land. There is nothing in the school life that he can associate with his own little world—his past experiences. He has, as it were, to start life again and create another world totally different from the first. There is little wonder that teachers find such great difficulty with their primary classes, with the beginners in this new life.

Let me make an appeal for more natural teaching in our rural schools—teaching that will look to the pleasure and comfort of the child, and also that will tend to prepare him for the life he is to live. This can be done best, as already stated, by the proper use of Nature Study and the School Garden.

If, then, the rural school is to fulfil its mission to the community, as the handmaid of agriculture, it must be a school adapted to the needs of the community. *It must be an adaptation of education to need.* Whose needs? The farmer's. To meet these he must have the advantage of the best schools; and the best schools for him are those which teach him the things that he needs to know. What does he need to know? What are his educational needs? As a man and a citizen, he needs to know just what other people do—no more, no less. He needs to know how to read, to write, to compute, etc. As an agriculturist, his needs are more special. He deals with the natural world. His enjoyment and his livelihood depend largely upon his understanding of the laws that control the world about him. He must therefore know Nature. He can know her best by becoming interested in her. When he is young is the time to engender an interest that will continue throughout life. The farmer above all others should be a thorough nature student, and one of the purposes of the public school should be to help and direct him in these studies.

One of the great aims of Nature Study is to interest the child in agricultural problems. The School Garden more than anything else will achieve this purpose. Such a garden will be indispensable in the schools of the future. Ere long it will be as much a part of the regular equipment of the school as books, blackboards, charts and apparatus are. The making of a School Garden is an epoch in the life of each school; it marks the progress of the school in pedagogical ideas. Its prime motive is not to be ornamental, but to be useful. In many parts of England and Germany it is rapidly becoming the "school"—the place where most of the instruction is given. This is the ideal method, "a school in the country, where hardihood of life can be cultivated, and where life is simple and varied; a school where masters lead a common life with the boys, working at gardening or plowing, as well as with books. In such a school, work consists of interchange of occupation—continuous but varied; some lighter, some severer, some taxing muscles and some brain. In such a school there is established a collective, corporate life, in which each member learns self-reliance, individual responsibility and constant adjustment of the relation of self to other people. The virtue that here grows up, will not be negative—constrained by external forces—but active virtue that springs from having lived in a well-organized community.

THE OTTAWA FIELD-NATURALISTS' CLUB.

UNDER THE DISTINGUISHED PATRONAGE OF THE RIGHT HONORABLE
THE EARL OF MINTO, GOVERNOR-GENERAL OF CANADA.

PROGRAMME OF WINTER SOIRÉES, 1903-1904.

1903.

Dec. 15.--TWENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE CLUB.

Address of Welcome, by Principal J. F. White, of the Normal School.

The President's Address.

The Study of Natural History at Ottawa before the Formation of the Club. Lieut.-Col. W. White, C.M.G.

Botanical Conditions Round Ottawa twenty-five years ago. R. B. White.

Ottawa as a Natural History Locality twenty-five years ago. Dr. James Fletcher.

The Workers in Natural History at Ottawa twenty-five years ago Lieut.-Col. W. P. Anderson.

What the Ottawa Field-Naturalists' Club has accomplished. Dr. H. B. Small.

1904.

Jan. 5.—*The Differences and Correspondences between the Avi-fauna of Ottawa and of the Maryland Alleghanies.* Rev. G. Eifrig.

Report of the Geological Branch.

Jan. 19.—*The Recent Landslide on the Lièvre River.* Illustrated by lantern slides. Dr. A. E. Barlow.

Report of the Ornithological Branch.

Feb. 2.—*Sap and Sap Circulation.* F. T. Shutt, M.A.

Two Springs. Dr. C. Guillet.

Feb. 16.—*A Summer's Cruise on the Labrador Coast.* Illustrated by lantern slides. Dr. R. A. Daly.

Mar. 1.—*Colour in Nature.* Dr. S. B. Sinclair.

Report of the Entomological Branch.

Mar. 15.—**Annual Meeting.**

Report of the Zoological Branch.

Report of the Botanical Branch.

April 5.—Short Talks on how to Collect and Preserve Specimens, with Practical Demonstrations by various members of the Club.

All the meetings will be held in the Normal School, at 8 o'clock p.m. sharp, on the first and third TUESDAYS of the month.

President, W. T. MACOUN.

Treasurer, A. GIBSON.
(Central Experimental Farm.)

Secretary, W. J. WILSON.
(Geol. Surv. Dept.)

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THE OTTAWA NATURALIST.

VOL. XVIII. OTTAWA, APRIL, 1904. No. 1

THE REPORT OF THE COUNCIL OF THE OTTAWA FIELD-NATURALISTS' CLUB FOR THE YEAR ENDING 15TH MARCH, 1904.

During the year twenty-one ordinary members and one honorary member were added to the Club. The total membership is now 266, composed of 258 ordinary members and eight corresponding.

SOIRÉES.

All the soirées except the last have been held and have proved interesting and profitable; the attendance being up to the average. The full programme was printed in the March number of THE NATURALIST. The first meeting was of special interest, as it was held to celebrate the twenty-fifth anniversary of the founding of the Club. The speakers were all members of the first Council, and each told briefly of some of the many changes that have taken place during the past twenty-five years, and the part the Club has taken in directing and leading scientific thought in the community—a record which fully justifies the Club's right to exist, and one which should command the hearty sympathy and support of all intelligent people.

EXCURSIONS.

Nine sub-excursions were held during the year at which the attendance varied from twenty to two hundred. These excursions were to places in the immediate vicinity of Ottawa and were highly successful. Special attention was given to the forest trees, their mode of growth and the various means of identifying them, especially by the buds. The two general excursions were to Chelsea and Alymer, the former, held the 16th of May, was attended by over three hundred members and friends of the Club, and altogether was one of the most successful ever held at that beautiful place ; the latter to Aylmer although successful was not so largely attended. These excursions form the most important part of the Club's work. The outings themselves are most healthful and enjoyable, but when to the pleasure of a tramp through the open glade or leafy forest is added an opportunity of observing or learning something of the beauty that abounds in every rock, plant or insect, the outing is doubly beneficial. These excursions give an excellent introduction to Nature Study, about which so much is written at the present time. Full accounts of the localities visited and the work done at these outings have appeared from time to time in THE OTTAWA NATURALIST.

THE OTTAWA NATURALIST.

The seventeenth volume of THE OTTAWA NATURALIST has been completed. It contains twelve numbers of 228 pages with eight plates. The following are some of the papers published in this volume :

Yukon Hepaticæ, by A. W. Evans.

The Nesting of Birds at the Central Experimental Farm, by W. T. Macoun.

Description of a new species of Matheria from the Trenton Limestone at Ottawa, by Dr. J. F. Whiteaves.

The Beetles of the Oregon Beach. by H. F. Wickham.

A Red-shouldered Hawk in Captivity, by Roger T. Hedley.

Curiosity of a Hummingbird, by Dr. C. Guillet.

Moose with Elk Antlers, by Rev. Wm. A. Burman.

Description of a species of Cardioceras from the Crows Nest Coal Fields, by Dr. J. F. Whiteaves.

Nesting of some Canadian Warblers (3rd paper), by Wm. F. Kells.

Hunting for Caterpillars, by Arthur Gibson.

Petrography of some Igneous Rocks of the Kettle River Mining Division, B.C., by L. P. Silver.

Notes on the Nesting Habits of the Brown Creeper and Hudsonian Chickadee, by L. M. Terrill.

My Pet Crows, by L. H. Smith.

Winter Growth of a Water Lily, by Walter S. Odell.

Notes on some Canadian specimens of "Lituites undatus" (2 papers), by Dr. J. F. Whiteaves.

A Robin Story, by Emery Perrin.

The Lower Jaw of Dryptosauras incrassatus (Cope), by Lawrence M. Lambe.

A Weed Worth Growing, by Dr. James Fletcher.

Biological Notes on Canadian species of Viola, by Theo. Holm.

Remarks on some Marsh Dwellers, by L. M. Terrill.

A Woman's Visit to a Peat Bog, by Miss M. McKay Scott.

Our Eagles and Ospreys, by Rev. C. J. Young.

President's Address, by W. T. Macoun.

Some Canadian Antennarias, by Edw. L. Greene.

A Night's Collecting for Moths at Meech Lake, by Arthur Gibson.

Besides several short articles, book reviews, etc.

An important series of articles on Nature Study, edited by Dr. J. Fletcher, have been published each month, beginning with May, 1903. They were written by Dr. James Fletcher, D. A. Campbell, Dr. S. B. Sinclair (2 papers), W. A Dent, A. E. Attwood, Professor W. Lochhead, Dr. G. U. Hay, W. T. Macoun, L. A. DeWolfe, and J. W. Hotson. A large number of copies of each article was printed and distributed to teachers throughout the Dominion. These articles presented Nature Study from various points of view, and have doubtless proved of great value to those interested in the subject. They have proved so popular that a special committee of Council has decided to continue the publishing of these articles.

REPORTS OF BRANCHES.

The Botanical Branch reports as follows :—

"Good work has been done by the Botanical Branch during the past year. Professor J. Macoun, in his official capacity, spent the whole summer in Ottawa and vicinity studying the flora of the district, but especially the fungi for Part VIII of his Catalogue of Canadian Plants. He added over two hundred species to the Ottawa flora. Dr. James Fletcher has continued his studies of violets and has done good work in growing the different species so that they could be studies at all stages of their growth. Dr. Guillet has continued his phenological observations, and has also made a study of the character of the past two springs as affecting the growth of plants. The studies of Mr. D. A. Campbell in the morphology of plants have also been of much value.

The regular fortnightly meetings of the Botanical Branch held at the homes of the members have proved a great success. These meetings were inaugurated by Dr. James Fletcher, the first one being held at his house on February 5th, 1903. The object of starting them was to keep up and promote an interest in botany among the members, and give an opportunity for the reading of notes and short papers on botanical subjects, and to have a general discussion on any matter which might be brought up by the members. Two meetings were held last year and fourteen this year, making sixteen in all, with an attendance of from ten to thirteen at each meeting. Many interesting subjects were discussed and much information was given. Full reports of nearly all of the meetings have been printed in THE OTTAWA NATURALIST. The following are some of the more important topics discussed. The advisability of sub-dividing the Ottawa district into four areas ; What is Nature Study ? ; Canadian violets ; Reasons for the "rosette" arrangements of leaves at the base of some plants at a certain period of their growth ; Weeds and the causes that lead to their dispersion ; Native plants which compare favorably in appearance and succeed as well as Exotic plants : How to know the edible and poisonous fungi ; How to study ferns ; Relationship between weather and plant growth—a comparative study of the last two springs ; Besides these many other subjects were discussed.

The leaders of the Geological Branch report that no systematic work has been carried on during the past year in the vicinity of Ottawa. Leaders in this branch, however, attended the excursions and assisted as far as possible in explaining the Geological problems presented by the different localities visited. It was noted with pleasure that a larger number than formerly joined the Geological section on these occasions.

The members of the Entomological Branch, although few in number, have been very active during the past year. The regular fortnightly meetings mentioned in last year's report were kept up during last spring and the present winter. Several interesting papers were read and considerable enthusiasm was engendered among the members of the Club. There has been a renewed activity in collecting and studying the insects of the Ottawa district, and good work has also been done by outside members. Mr. W. Metcalfe has taken up and made good progress in studying the local Hemiptera, many of which have been identified by Mr. Van Duzee. The Rev. G. W. Taylor, of Wellington, B.C., has amassed one of the best reference collections of the Geometridæ of North America, and has rendered great assistance in identifying specimens for collectors. The leaders have all been exceptionally active and large additions have been made to the local lists of insects.

The Ornithological Branch report that the leaders attended the excursions and pointed out the chief characteristics of the birds seen and aided those interested wherever possible, and also that through the help of the Hon. Frank Latchford arrangements have been made for the appointment of a special official to enforce the Provincial Act which prohibits the destruction or trapping of useful birds.

The Treasurer's Report shows a balance on hand of $39.18.

The thanks of the Council are again heartily extended to Principal White, of the Normal School, for the use of rooms in this building in which we have held all our soirées, and also for the continued use of a room for our library, and Council meetings. The Council again wishes to place on record its obligations to the daily press of this city for publishing notices of our meeting free of charge.

W. J. WILSON,
Secretary.

THE OTTAWA FIELD-NATURALISTS' CLUB.

The Treasurer's Statement for the year ending 15 March, 1904.

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Arrears	76	
		225 00
Advertisements		42 40
Authors' Extras sold		27 95
OTTAWA NATURALISTS sold..		20
Maps of Ottawa sold		50
Government Grant		200 00
		$537 78

EXPENDITURE.		
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The Treasurer begs to remind the members of the Club that their subscriptions are payable in advance, at the beginning, not at the end, of the Club year. A great many, he regrets to say, have allowed themselves to get into the habit of not paying their subscriptions until the receipt of a special appeal asking for funds. Members who have not paid their subscriptions for the current year—March, 1904, to March, 1905,—will oblige the Treasurer very much by sending them in as soon as possible. The expenses of the Club in connection with the printing of THE OTTAWA NATURALIST, etc., have to be met from month to month, and it is the wish of the Council that these be paid promptly.

THE CANADIAN SPECIES OF TROCHOLITES.

By J. F. WHITEAVES.

From the dismemberment and reconstruction of so many of the older genera of nautiloid shells of the Cambro-Silurian and Silurian rocks, which the progress of modern research has necessitated, the genus *Trocholites* has emerged unscathed.

First described by Conrad in 1838 and again in 1842, it has since been studied, described more fully, and illustrated, by Hall, Foord, Schröder, Holm and Hyatt.

The original description of the genus in 1838, on page 118 of the Second Annual Geological Report of the State of New York, is as follows : " Shell in the form of an Ammonite ; volutions contiguous, gradually increasing in diameter ; septa plain." And, the additional definition of the genus, in 1842, on page 274 of the eighth volume of the Journal of the Academy of Natural Sciences of Philadelphia, is in these words : " Involute ; symmetrical ; whirls contiguous ; the back of inner volutions rounded, fitting into a corresponding groove ; septa convex ; siphuncle near the inner margin." "This genus," Conrad adds, " differs from *Lituites* in having a submarginal siphuncle, and in not being extended into a straight or bent prolongation. The aperture is widely different, being of a lunate outline, whilst in *Lituites* it is nearly round." As now understood, shells of the genus *Trocholites* may be roughly described as small nautilicones, with slender whorls that are compressed on the venter and dorsum and expanded at the sides, their outline in cross section being usually reniform. The surface markings consist of small flexuous transverse ribs, ridges or striæ, often accompanied with spiral raised lines. The sutures of the septa are also flexuous ; the siphuncle of the adult shell is placed near the dorsum, or at least on the inner side of the centre ; and the chamber of habitation occupies from rather less than one-half to about three-quarters of the outer volution.

In the Guelph formation of Ontario there is a fossil that seems to be identical with the *Lituites multicostatus* of Whitfield (1882) which Hyatt says is synonymous with the *L. Graftonensis* of Meek and Worthen (1870), though it does not belong to the genus

Lituites, as now restricted, nor even to the Family Lituitidæ. This fossil was referred to *Trocholites* by the writer in 1884, and to *Discoceras*, Barrande, by Hyatt in 1894, who, however, admits the "close connection" between these two genera, and, in his latest publication,* includes both of them in his Family Trocholitidæ. It is still perhaps doubtful whether this Guelph species is a *Trocholites* or a *Discoceras*, but in the Cambro-Silurian rocks of Quebec and Ontario there are now known to be at least three undoubted and well marked species of *Trocholites*, upon which the following notes are submitted.

TROCHOLITES AMMONIUS, Conrad.

Trocholites ammonius, Conrad. 1838. Second Ann. Geol. Rep. St. N. York, p. 119.
,, ,, Emmons. 1842. Geol. New York, pt. II, p. 279, fig. 3; and p. 392, fig. 1.
Utica trocholite , Vanuxem. 1842. Geol. New York, pt. III, p. 57, fig. 3.
Trocholites ammonius, Hall. 1847. Pal. New York, vol. I, p. 192, pl. XL, A, figs. 4, *a—k*.
,, ,, Emmons. 1855. Amer. Geology, p. 146, fig. 29, and pl. XII, figs. 14, *a—d*, and 15.
,, ,, Ami. 1888. Canad. Rec. Sc., vol. III, no. 2, p. 105.
,, ,, Foord. 1891. Cat. Foss. Cephal. Brit. Mus., pt. II, p. 47.
,, ,, Hyatt. 1894. Phylogeny of an Acquired Characteristic, in Proc. Amer. Phil. Soc , vol. XXXII, no. 143, p. 486.

This species, which is the type of the genus, seems to be well characterized by its "very peculiar, rough, fretted surface" or "cuticular corrugations," that have been minutely described by Hall and Hyatt. Hall says that "this shell occupies a central position in the Trenton limestone" (of the State of New York) "being unknown in the lower part, but passing upwards into the Utica slate, where it is of less frequent occurrence."

So far, in Canada, *T. ammonius* has been found only in the Utica slate or shale. In 1878, Mr. Walter R. Billings showed the writer, specimens of it, that he (Mr. Billings) had recently found in the Government House grounds at Ottawa. But, it was not until ten years after this that Dr. H. M. Ami recorded the discovery and recognition of the species in Canada; at Ottawa in the second volume of this journal, and at Murray Bay, Whitby and Collingwood in the third volume of the "Canadian Record of Science."[1]

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* The article *Cephalopoda* in Eastman's translation of Zittel's Text-book of Palæontology.

TROCHOLITES PLANORBIFORMIS, Conrad.

Trocholites planorbiformis, Conrad. 1842. Journ. Acad. Nat. Sci. Philad., vol. VIII, pt. 2, p. 274, pl. XVII, fig. 1.

" " Hall. 1847. Pal. New York, vol. I, p. 310, pl. LXXXIV, figs. 3, *a—f*.

"Volutions higher than wide, longitudinally striated, and with oblique obtuse, transverse lines, approaching at an angle but rounded on the centre of the back; apex profoundly depressed; back of the large volution flattened; aperture much longer than wide. *Locality*. Near Grimsby, Upper Canada, in Salmon River sandstone. This elegant shell was found in a boulder, by Mr. S. Ashmead, of this city" (Philadelphia) "and by him presented to the Academy of Natural Sciences. A specimen was kindly given me by this liberal and enterprising mineralogist" (Conrad. In addition to this, Hall says that the surface of this species is "marked by obliquely transverse ridges, which bend backwards, forming a broad curve on the dorsal line, longitudinally striated with rounded lines." And, in specimens of *T. ammonius*, from the Trenton limestone, he says that he has "rarely found the transverse and longitudinal ridges so strongly marked."

So far as the writer is aware, no other specimens of *T. planorbiformis* than the two types from Grimsby have been found in Canada, as the fossils from Montmorenci or Montmorency Falls and Lorette that Dr. Foord identified with that species in 1891, prove to be referable to the since described *T. Canadensis*, Hyatt.

Hall, in 1847, describes *T. planorbiformis* as one of the fossils of the Hudson River (Lorraine) formation of the State of New York, and his successor, Dr. John M. Clarke, in 1903, in his "Classification of the New York series of geological formations," says that "Salmon River" is an early term applied to the local development of the Lorraine beds in New York. So that both in Canada and the United States this species seems to occur at a geological horizon immediately above the Utica shale.

TROCHOLITES CANADENSIS, Hyatt.

Lituites (*Trocholites*) *ammoneus*, Salter. 1853. Quart. Journ. Geol. Soc. London, vol. IX, p. 86; but not *Trocholites ammonius*, Conrad, 1838.

Trocholites planorbiformis, Foord. 1891. Cat. Foss. Cephal. Brit. Mus., pt. II; but not of Conrad (1842) nor of Hall (1847).

Trocholites Canadensis, Hyatt. 1894. Phylogeny of an Acquired Characteristic, in Proc. Amer. Philos. Soc., vol. XXXII, p. 486, pl. IV, figs. 23 and 24; and pl. VI, figs. 39 and 40.

"Loc., Falls of Montmorency, near Quebec.

"The four specimens representing this species" (*T. Canadensis*) "came from the Bronn collection. They are similar to *T. ammonius* in form, but differ in being broader proportionately in the transverse diameters of the whorls and have deeper umbilici. The whorls are rounded, there being no tendency to angularity, either of the sides or abdomen, and in these specimens the size is small. There are fold-like costæ from an early neanic state, and the living chamber may be considerably over one-half of a volution in length. The exterior is marked by longitudinal lines along the venter and often on the sides, but these have none of the regularity and prominence observable in Conrad's figure, and that figure shows no costations which are more prominent and fold-like in this than in *T. ammonius* or any other described species of *Trocholites*" (Hyatt). These specimens, it may be added, belong to the Museum of Comparative Zoology at Cambridge, Mass.

In 1901 Dr. H. M. Ami collected some interesting fossils from the Trenton limestone at the Natural Steps, a little above the Falls of Montmorency, and among them there are five good specimens of a species of *Trocholites*, which have recently been studied by the writer. They prove to be well preserved and very characteristic examples of *T. Canadensis*, and are in all respects essentially similar to the types of that species, which have been kindly lent to the writer, for comparison, by Dr. W. Y. M. Woodworth, the Curator of the Cambridge Museum. And, a study of the original types of *T. Canadensis* and of the similar specimens collected by Dr. Ami, has necessitated the conclusion that the fossils collected by Dr. Bigsby in 1822 at Montmorency Falls and at Lorette, which Salter referred to "*Lituites* (*Trocholites*) *ammoneus*" and Foord to *Trocholites planorbiformis*, are also identical with *T. Canadensis.*

To test the correctness of this conclusion, two of the best specimens of *T. Canadensis* that Dr. Ami obtained at the Natural Steps, were sent by the writer early in January last, to Mr. G. F. Crick, of the British Museum (Natural History), for comparison with the presumably similar specimens collected by Dr. Bigsby, in that Museum. In reply to this communication, Mr. Crick thus writes, in a letter dated January 22nd, 1904: "I have carefully examined the specimens in this Museum to which you refer and am quite satisfied that they are specifically identical with the examples of *Trocholites Canadensis*, Hyatt, that you have sent for comparison. The following particulars about the specimens here may be of interest to you. This Museum contains five examples from Montmorency and two from Lorette, that Dr. Foord (Cat. Fossil Cephal. Brit. Mus., pt. II, p. 49) referred to *Trocholites planorbiformis*, Conrad. The two specimens from Lorette (No. 26568) were presented to the Museum by Dr. Bigsby. The five Montmorency specimens are among the foreign collections transferred from the Museum of Practical Geology. Four of these (c. 4105, *a—d*) were presented to that Museum by Dr. Bigsby, but how the other specimen (c. 4106) was obtained is unrecorded; it bears an original label 'near Montmorenci Falls, near Quebec.'" In a later letter Mr. Crick adds that it would seem that Dr. Bigsby presented examples of the species both to the British Museum and also to the Museum of Practical Geology in 1851.

Professor Hyatt did not state at what particular geological horizon his *T. Canadensis* occurs. But the limestone at and near Montmorency Falls, and at Lorette, is distinctly stated to be Trenton by Dr. Bigsby in 1853,* and by Dr. R. W. Ells in 1889.†

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* Quart. Journ. Geol. Soc. London, vol. IX, pp. 84—86.

† Geol. and Nat. Hist. Surv. Canada, Ann. Rep., N.S., vol. III, pt. 2, pp. 22K, and 19K.

The writer has seen no specimens of *T. Canadensis* from Lorette, but if, as seems possible, it there occurs associated with *Plectoceras Halli*, then the horizon of both of these species at that locality may be that of the Trenton rather than that of the Black River limestone.

In Canada it would seem that *Trocholites Canadensis* is characteristic of the Trenton limestone, perhaps of its lower beds, and considerably below the Utica; *T. ammonius* of the Utica shale; and *T. planorbiformis* of the Hudson River or Lorraine formation, above the Utica.

Ottawa, March 15th, 1904.

MOLLUSCA NEW TO THE CANADIAN FAUNA.

While staying at Oxley, Ontario, in the fall of 1903, Miss Mary E. Walker, of Buffalo, N.Y., made a collection of the mollusks found there, which was submitted to me for examination. Among them were two species, which, so far as I have been able to ascertain, have not hitherto been recorded from Canada.

1st.—VALLONIA PARVULA, Sterki.

This is a well marked species, easily distinguished from *V. costata* by its smaller size, more depressed form and wider umbilicus. Originally described from the Western States, it was found by myself several years ago at Put-in-Bay. Its discovery at Oxley extends its range still further north. The occurrence of this species at two localities so near together, and so far away from its normal range, with no known record of its having been found in the intervening region, is a curious fact in distribution, and one not easily accounted for.

2nd.—PISIDIUM DANIELSI, Sterki.

This is a new species described by Dr. Sterki in the "Nautilus" for August, 1903, (Vol. xvii, p. 42) from specimens collected in Steuben County, Indiana. Its discovery at Oxley is the first record of its occurrence at any other than the type locality.

BRYANT WALKER.

WARBLER SONGS AND NOTES.

By REV. G. EIFRIG.

Now that the crows, the vanguard of the annual bird migration from the south, have arrived, and two or three bluebirds even have coyly appeared in a sort of tentative way, to see whether winter would not soon disappear in earnest, we may reasonably expect to soon see larger divisions of the great bird-army. In April the sinister companies and battalions of the blackbirds often make themselves apparent even to the casual observer, the purple and rusty grackles with their discordant gurgling, and the fine redwinged blackbirds with their martial *congarée*. Besides these some larger birds, which however do not make themselves so apparent, will then come, some herons and hawks ; also the little trusty phœbe with the plaintive note from which its name is derived. And then comes glorious May, which brings surprises and joys each day in the animal and vegetable kingdoms. Then huge waves of warblers, finches, thrushes, vireos or greenlets, plovers, etc., arrive daily. Then is the time for every one who can, naturalist, professional, amateur or otherwise, lovers of nature and the beauties of it, to arm themselves with an opera glass and lens, and note book, and see, observe, behold and drink in as it were the beauties and lessons and mysteries that nature holds up to our raptured vision. Some of the finest and most interesting objects that we then can and ought to become acquainted with are the birds. Watch them with or without glass, try to impress their chief characteristics on your mind, and if you do not know the bird and are a beginner in bird-craft, look up at home your Bird Neighbors, or some other popular book on birds, and see what the bird you did not know was. And the more you learn thus by your own exertion, which is at the same time pleasure, also healthful to a degree, the more you want to learn and find out ; the love of it will grow on you.

After knowing the birds by their color, size, etc., a person should try to attain some proficiency in recognizing them by their songs and other notes. Of course, if all the birds would announce their names as plainly as the chickadee, or the phœbe or bobolink, this would be comparatively easy. However, this is not the case, and therefore, it takes more or less patient observation to be able to tell them by their notes.

Some of our prettiest, but at the same time smallest and most elusive birds are the warblers. On some days the open woods are full of them. They are abundant and pretty, yet most people never see them, even if they are at home in their orchards, because they are so small and restless, always moving about. Most of them are so beautifully and conspicuously marked, that if a person once knows when and where to look for them he can readily become acquainted with them. But it takes much patience and stretching and twisting of necks to accomplish it. Therefore, I soon after undertaking it came to the conclusion that it would be advantageous to be able to recognize a warbler by its song or rather lisping—for that is in many cases all, despite their name as a class—that their musical efforts amount to. And to aid nature and bird lovers to learn to know and identify warblers is the *raison d'etre* of this article.

When I heard a warbler song I did not know, I followed up its owner until I positively identified him, then I tried what syllables would reproduce the impression best, and these I jotted down in my note book on the spot. These first impressions sometimes have to be corrected later on, often the first is as good as the last. This I would advise everybody to do who would learn to know the birds by their song.

The following list is loosely arranged according to the time of appearance of the different species at Ottawa, and to the degree of frequency in which they are generally seen.

BLACK AND WHITE CREEPING WARBLER, *Mniotilta varia.* To be seen in open woods of deciduous trees, creeping around limbs and trunk of trees, not high up; color as implied by name. Song insignificant, a repetition of the syllable *sweet.* One I heard sang: *Switta, switta, switt.* One writer gives its song, *Weachy, weachy, weachy, twee, twee, twee, tweet.*

YELLOW WARBLER, *Dendroica aestiva.* This common warbler is entirely yellow, the male having narrow reddish stripes on the lower side, which are apparent only at a near view. This is a bird not so much of the woods as of the open, frequenting trees in fields, along fences and even in cities, where it also nests. Its song is, *Sweet, sweet, sweet, sweet, sweeter, sweeter,* or *Sweet, sweet, sweetie,* or *Weeche, chee, chee, churwee,* as Prof. Lynds Jones gives it.

REDSTART, *Setophaga ruticilla.* This pretty feathered bit of energy and restlessness can be easily recognized by its conspicuous salmon red with black, which it always displays fully. Its note is not so distinctive; I could never formulate it in syllables to give satisfaction; it is much like that of the preceding two species. Mr. Chapman gives it *Ching, ching, chee, ser-wee, swee, swee-e-e.*

CHESTNUT-SIDED WARBLER, *Dendroica pensylvanica.* The adults of this species are easily told by the chestnut stripe on sides and bright yellow crown. They frequent second growth deciduous woods; they nest low. Song: *Peary, peary, peé-a,* rather subdued. Miss Roberts gives it, *Tsee, tsee, tsee, happy to meet you.*

OVENBIRD, *Seiurus aurocapillus.* Abundant in open woods, *walking* on the ground looking for ants. Its common song with which it greets intruders in its domain is exactly rendered by Mr. Burrough's transcription: teacher, *teacher,* TEACHER, TEACHER, **TEACHER**. Some however, seem to put the accent on the second syllable, or at least many hear it that way, some like *te cheé,* etc.

MARYLAND YELLOWTHROAT, *Geothlypis trichas.* This cheerful and nimble little sprite can easily be identified by its markings as well as by its song. It is bright yellow on breast and head, except a black band on cheeks, ear coverts and forehead. Its song plainly is: *Witchety, witchety, witchety*; accent on first syllable. It frequents bushes and prefers swampy or at least wet situations.

YELLOW-RUMP WARBLER, MYRTLE WARBLER, *Dendroica coronata.* Has four yellow patches on crown, at shoulders and on rump, otherwise bluish-gray, streaked with black. Not much given to song: one author gives it, *Twhip twéeter, twéeter.*

BLACK-THROATED GREEN WARBLER, *Dendroica virens.* Its colors are indicated by the name, yellow on under side. Its song, if once heard well, can not easily be forgotten. It is: *Dee-dee, dée, ah-di.* It is loud, ringing, cheerful. Prof. Jones has heard it this way, *Pe te, che-o te.*

BLACK-THROATED BLUE WARBLER, *Dendroica caerulescens.* Where the preceding one is found, this one may also be looked for. They frequent bushy, open woods and are mostly seen in the branches of medium sized trees. Its best song is ; *Dill-dill dill-dreé*, rapid, ascending. When busy feeding or later in summer it abbreviates this into, *Re-dereé-di*, *Tsree tsree tsreé*, or even a shrill, whistle-like, *Trree.*

MAGNOLIA WARBLER, *Dendroica maculosa.* This handsome black and yellow warbler has quite a repertoire of lays and ditties, which all however do not amount to much. Its best performance is a loud, impulsive, *Iree dereé di.* At other times it sings like the Chestnut-sided warbler: *Peary*, *peary pee a;* then again monotonously: *Tsee*, *tsee*, *tsee*, etc., or it utters a rather melodious disyllable *Tsee-wit*, *tsee-wit.*

BLACKBURNIAN WARBLER, *Dendroica blackburniæ.* This winged gem of black, white and deep orange sings little and then very poorly, a faint. hesitating, *Dee dee dee*, in one pitch of tone, or even only : *De de de.*

PINE WARBLER, *Dendroica vigorsii.* True to its name, this warbler lives only in pine-woods or in single pines amongst deciduous trees. Its color is dull olive and the song exactly like that of the Chipping Sparrow ; it cannot well be reproduced by syllables.

CANADIAN WARBLER, *Wilsonia canadensis.* This warbler is of a somewhat pensive and retiring disposition. It prefers swampy and bushy places. The breast is bright yellow, with a neck-lace of black spots, back bluish gray. The only song I have heard sounds like a faint imitation of the Maryland Yellow throat, a subdued, halting : *Witchety*, *witchety.* When alarmed in their quiet haunts they utter a sharp *tsip* or *tsink.*

BLACKPOLL WARBLER, *Dendroica striata.* Black and white, with a black crown, larger than most warblers, Its song is a very insignificant dry : *De de de*, uttered very leisurely.

NASHVILLE WARBLER. *Helminthophila ruficapilla.* A bright yellow warbler, bluish gray on top. The song is variable. Some give it : *Wee-see*, *wee-see*, *wit-a-wit-wit ;* others : *Ke-tse*, *ke-tse*, *ke-tse*, *chip-ee-chip-ee-chip.* Rather loud and lively.

BAY-BREASTED WARBLER. *Dendroica castanea.* A migrant only here. Song just like that of the redstart.

TENNESSEE WARBLER. *Helminthophila peregrina.* Song like that of the chipping sparrow, except first two syllables, which are *twip* instead of *chip.*

CAPE MAY WARBLER. *Dendroica tigrina.* Rather rare migrant and rather quiet too. Song something like black and white creeper: *awit, awit, awit, awit, awit*, as Prof. Butler puts it.

PARULA WARBLER, Blue Yellow-back Warbler. *Compsothlypis americana.* "Parula's song is hardly wiry, but it is fine and delicate—more like hair than wire. The more delicate singers seem to say, *Pe-tse, pe-tse, pe see see,* or: *cher-re-re, cher-re-re, cher-re-re.*"

PALM WARBLER, *Dendroica palmarum.* Song: *Tsee, tsee, tsee, tsee,* with a distinct swell. (Prof. Jones).

YELLOW PALM WARBLER. *Dendroica palm hypochrysea.* Like preceding.

MOURNING WARBLER. *Geothlypis philadelphia.* Song: *Tee te-o, te-o, te-o, we-se,* or: *True, true, true, true too.*

WILSON'S WARBLER. *Wilsonia pusilla.* Song like yellow warbler or redstart.

Ottawa, March 28, 1904.

HUGE PUFF-BALLS.—Mr. J. Smith of the Topographical Surveys Branch, found a very remarkable puff-ball (*Lycoperdon gigantum*), about a mile from Breckenbridge Station, on the Pontiac and Pacific Railway, on the 25th of August, 1903. It measured 56 inches horizontal girth, and 44 inches vertical girth, a perfect specimen with skin as white and smooth as a piece of kid. There were five other large ones within a few feet of it, some of them decayed, others not fully grown. Mr. Smith has seen large puff-balls at the same place for several years back. Such specimens are not rare about Ottawa, but it is believed that that found by Mr. Smith is the largest ever seen in this district.

JOHN MACOUN.

THE EVENING GROSBEAK.

(Cocothraustes vespertina.)

By C. J. YOUNG.

The readers of THE OTTAWA NATURALIST who are interested to any extent in our birds, will learn with interest that a migration of evening grosbeaks has occurred this winter in Ontario. This bird always creates an amount of interest, partly by reason of its rarity and beautiful plumage, and partly because its summer home and breeding habits are still but imperfectly known.

It visits Ontario at long intervals; this year it has been seen in pairs and small flocks in the neighborhood of Kingston, Ont.,—even within the city limits. A beautiful male was procured by Mr. E. Beaupré on Feb. 23rd, which I saw in the flesh shortly after it was shot. A pair was secured out of a flock at Cataraqui during the same week, and birds had been observed at Williamsville during January. In each case they were feeding on the seeds of the Manitoba maple (*Negundo aceroides*), a tree that only of late years has assumed sufficient proportions in Ontario to bear fruit. It will be interesting to learn whether this bird has been observed elsewhere in Ontario during the present winter.

The evening grosbeak is a rare bird everywhere, though of more frequent occurrence in the west than in the east. It was first described by Mr. William Cooper, of New York, from a specimen obtained by Mr. Schoolcraft near Sault Ste. Marie in April, 1823. The next specimen recorded was obtained in the month of August in the same year by Major Delafield, north-west from Lake Superior. From that time to the present the bird has been occasionally recorded in Canada, but as far as I know there is no record of the discovery of the nest except from the United States.

Acccrding to the late Mr. McIlwraith, of Hamilton, Ont., the first report of its appearance in the settled parts of Ontario was in the year 1866, when in the month of May two were obtained by the late Dr. T. J. Cottle at Woodstock. The next record was in 1871, when they were observed in the spring near London, Ont.

Then in March, 1883, Mr. McIlwraith himself saw two near West Flamboro.

The largest migration seems to have been in 1890, when they were frequent about Kingston and elsewhere, and a flock was noticed as far east as Quebec. Again in 1896 two were seen at Kingston. Then none until the present year, 1904, when, during January and February, they have been observed and obtained about Kingston. This completes the record for Ontario to date.

With regard to the nest of the bird and its breeding habits, the honor of discovering it rests with Mr. Jno. Swinbourne, of Springerville, Arizona, who found it on 5th June, 1884, in a canon 7,000 feet above sea level. (*Vide* Auk, vol. v, p. 113.) The next nest was recorded by Mr. W. E. Byrant, as taken by a Mr. Fiske, of the U. S. Geol. Sur. on a hill-side in Yolo Co., Cal., in 1887. The third and last record I can find was a nest and four eggs collected by Mr R. H Beck in the Sierra Nevada Mts., in 1896, a beautiful colored plate of which is published as a supplement in the Nidologist, Sep. 1896, vol. IV, No. 1.

NOTE.—Mr. Edwin Beauprè has sent for publication in THE NATURALIST his notes on the occurrence of the evening grosbeak, The substance of these notes has been embodied in Mr. Young's article above, but Mr. Beaupré says further: "The two flocks that visited the city spent their time feeding on the fruit of Manitoba maple. Locally, this winter's visitation makes the third record since 1890. From the 22nd to the 25th I saw them each day; one evening when I visited the street on which the maples are growing, I found three richly colored males whose striking plumage of white, yellow and black, brightened by the departing rays of the wintry sunset, seemed entirely out of contrast with their surroundings of bleached and withered fruit on which they were sumptuously feasting.

NATURE STUDY—No. XII.

SCHOOL GARDENS IN GREAT CITIES.

(Report of Committee on Industrial Training submitted to the Public Education Association of Philadelphia.)

Facing the Hudson, on the west side of New York City, is a piece of condemned land awaiting improvement, ironically called DeWitt Park. The most vivid imagination could not have conceived a more desolate spot than this was in the summer of 1902. Approached from the east through filthy streets, crowded with noisy, dirty urchins, it loomed up a dark blot on the beautiful background of cool river, green hills and blue sky. Rows of tumble-down houses, disused carts, piles of rubbish, stones, rags and litter, among which the children played, made even the streets seem neat and orderly by comparison.

In the centre of this plot of ground it was evident that something of more than ordinary importance was occurring. The air was black with flying missiles, while excited groups of children ran hither and thither. To all enquiries came the reply, "We are getting ready for our farm." The idea of a farm in that unfavorable spot might have made the inquirer slightly skeptical, but had he stayed to see, the changes wrought were little short of marvellous. The children's ready hands, assisted by older brothers and sisters, and by workmen from the Park Department of Manhattan, accomplished wonders. Stones and rubbish vanished, the hard earth yielded to the plow and harrow. Load after load of rich loam was bought. A fence enclosed the selected space. Walks were laid out, and plots marked, and after days of earnest work the "farm" was ready to receive the seed.

Twenty-five children filed in at the gate and received a practical lesson in planting from the gardener. Teachers meanwhile registered names and properly tagged each "farmer." These tags, upon each of which the name of the child and the number of the plot assigned were registered, were certificates of ownership to be presented at the gate as a pass to enter. The lesson over, the children marched to their respective plots and planted the seeds given to them as they had been shown how to do by the gardener. New groups followed them, and soon in that desert waste rose an oasis of living green, orderly, neat and picturesque —the first Children's School Farm in New York City.

One hundred and twenty-five farmers cared for their plots during the first season, but in the following spring so many requests for "farms" were received that the Park authorities decided to enlarge the space allotted, so that nearly three hundred boy and girl farmers, varying in age from eight to eighteen years, were happily employed during the summer of 1903. Through the long hot days of July and August you might see them watering, weeding, hoeing, or quietly sitting around the central flower plot listening to a Nature Study talk by the attendant teacher.

Improvements upon the surrounding land followed rapidly in the wake of those upon the farm. Toward the east, the Park Department had placed a huge open air gymnasium and playground. Toward the west, a tiny country seat, with a 12 by 18 ft. farm-house. A green lawn and flower beds, a pavilion, a pig-pen and a chicken house had been added to the farm property. Still further west stood a sand tent, and a second canvas formed a resting place for tired mothers. A typical afternoon might have shown eighty or a hundred children busy in the gardens ; in the pavilion a sewing class and a group weaving baskets for farm produce ; in the tiny house tea being served by neatly aproned housekeepers ; while on the lawn the boys played croquet. During September groups of children from neighboring kindergartens flitted through the garden in the mornings, while the proud owners appeared when school hours were over, basket or bag in hand, ready to carry home their harvest, and spade over their plots, leaving them clean and neat, prepared to defy winter's coldest blast.

As order emerged out of chaos, as stones and rubbish disappeared, the restless, careless horde of children grew daily more quiet and gentle. The wilderness that blossomed as the rose was not only the oasis in the desolate waste of ground, but also in the hardened little lives, now softened by God's wholesome sunshine, in the careless hands that grew so tender with the delicate blossoms, the wayward feet that learned to run the narrow paths without swerving to the right or left, the half opened eyes, before seeing naught but the factories around, now dimly descrying the Hudson and the light on the hills beyond.

The history of the making of the New York Garden is that of gardens in many cities. Back yards are no longer unsightly. In some cases the stone flagging of the school yard has given place to miniature gardens of great beauty. Historically, gardens for instruction have been an educational factor for many centuries. Nearly 2500 years ago Persian boys received instructions in agriculture and horticulture, in gardens set apart for that purpose. Through the middle ages gardens for educational purposes existed throughout Central Europe. The first definite movement toward establishing *school* gardens was made in Australia in 1869, when a law was passed instituting gardens in connection with all schools in country districts.

In *school* gardens must lie the main interest of those who believe that the public schools are the basis of national character. Statistics upon this subject are difficult to obtain, but an idea of the extent to which this branch of education is carried in European countries may be obtained from the following statement. In Austria there are no less than eight thousand school gardens, in Sweden two thousand and sixteen, while in France practical gardening is taught in 2,800 primary and elementary schools.

America has only begun to realize her opportunity in the value of school gardens as an educational force among the thousands of children in her crowded cities. An effort is being made to attract the attention of educators to the "Model School Garden" which, directed by Mr. Hemenway of the Hartford School of Horticulture, will be a most attractive feature of the World's Fair at St. Louis.

If the Public Education Association of Philadelphia succeeds in its effort to have at least one school garden opened in the summer of 1904, the garden movement will have been at least inaugurated in four great Eastern cities, New York, Boston, Philadelphia and Washington. The first school garden in America was started by Mr. Henry S. Clapp at Boston, in 1890. The garden was originally intended for wild flowers and so well has the work succeeded that at the present time it includes more than one hundred and fifty native wild plants. In 1901, a large vegetable garden was added to the flower garden. Last season Boston had sixteen of these gardens and with only this small number Boston is yet far ahead of other cities in America in the school garden movement. The work at the Hartford School of Horticulture, under its capable director, Mr. Hemenway, has attracted considerable attention. Boys and girls come from the city to care for their gardens, of which there were one hundred and sixty-three last season, with the supply still far short of the demand.

At the Massachusetts State Normal School, at Hyannis, Mass., a portion of the campus was converted into a garden, which, from a commercial standpoint, was ably conducted. Each pupil was provided with a blank book into which he copied bills of the produce sold, the deposits at the bank and the checks drawn. The amount that was realized the first season was thirty dollars.

Although not connected with any institutions of learning, the Boys' gardens of the National Cash Register Co., in Dayton, Ohio, have been most important in the results that they have effected. The gardens here are 10 by 130 feet, or larger, large enough to be of commercial importance. As an example of what can be done with a garden of this size, "one boy provided a family of five with vegetables during the entire season, and in addition to this made five dollars." A competent gardener instructs the children in their work. There are various gardens in other cities in connection with schools or settlements, but the work is extremely irregular.

An idea of the cost for maintaining a school garden of one-half acre during the first season may be obtained from the following rough estimate given for Philadelphia.

Preparation of ground, including fertilizers	$35 00
Fencing, tool-house, tools	225 00
Literature, insect mounts, materials for simple experiments	10 00
Seeds and plants	30 00
Total	$300 00

This estimate does not include the salaries of attendant teachers. Trained teachers are more valuable than agriculturists without knowledge of pedagogical methods. Teachers not versed in agriculture may be supplemented by a good gardener ; if, however, the teachers do understand gardening, a laborer may take the gardener's place. This man occupies an important position in the work. He supplies the place of a janitor and assists the children in any work that is too heavy for them, such as breaking up earth with a pick-axe or managing a fifty-foot hose. During the fall, when the children are at school most of the day, he acts as a watchman, sending away truants, and during this time when weeds grow rapidly and the children's hours of work are few, he also assists in keeping the garden clean. The supervisor of the garden must be a woman that is capable of supervising and directing the work of preparing the ground, laying out plots, and erecting buildings. Some knowledge of surveying, plotting and draughting is also indispensable to her, as she will necessarily have to plan the laying out of the garden and direct both children and workmen. Upon the supervisor falls the duty of engaging workers and the responsibility of overseeing each step. Estimates and purchases of seeds and plants and the whole government of the practical gardening is to be planned by her. In addition to this, she usually gives daily nature-study talks, which must be adapted to the varying ages of the children. As harvesting progresses accurate records of produce per child, attendance of said child, effect of work upon his physical, mental and moral being must be registered. All of these steps are worth while because gardening is yet in its infancy and statistics must be obtained to convince those unwilling to embrace the idea, of its merit. Such individual records must be kept for two hundred and fifty children, to be afterwards added, balanced and the average found, more than filling the teacher's time during the hours in which the children are at school. Many interruptions to this work occur in the form of visiting classes to which the supervisor explains the work of the garden.

In Porto Rico, where school gardens are maintained by the United States government, and are connected with every public school, teachers are regularly trained for the work in the course of theoretical and practical lessons on Agriculture. Trained teachers are somewhat difficult to find. Both Boston and Washington have foreseen this difficulty and are preparing young women for garden work,—Boston by means of the Science Department of her Normal School, Washington by a special course for Normal students, given at the school by Prof. S. C. Corbett, Horticulturist of the United States Department of Agriculture.

The Public Education Association of Philadelphia has been conducting correspondence upon the subject of school gardens, and the letters received seem to show that gardens have been connected more frequently with public schools than with private institutions, and that while the work has never been compulsory upon either teachers or pupils, it has proved a popular novelty wherever undertaken, giving healthy out-of-door study. Unfortunately the lack of space in great cities restricts the privilege of practical gardening to a comparatively small number of schools. A similar reason and consequently dearth of accessible material have been given for the lack of properly conducted nature-study in our public schools. Europe is in this respect far ahead of America. In Berlin, for instance, special gardens are maintained by the municipality, in which flowers, shrubs, and vegetables are grown in order that specimens required may be daily picked and sent in waggons hired by the city to those schools so situated that gardening is an impossibility. It has been suggested and advocated by at least one Associate Superintendent of Schools in New York City, also Mr. Gustave Straubenmuller, that a portion of Central Park be set aside for this purpose, and that specimens from its school garden be then sent daily to schools in Manhattan. Other parks that are used little by the public might fulfil a similar function. This at present seems to be the only solution of the problem of supplying schools with proper materials for Nature-study. As a new idea this may seem preposterous, but the day of experiment is past; Nature-study and gardening have become important educational factors, and thinking men and women are devising means to bring them within reach of every child in the public schools.

Of the neglect of this subject in our country Mr. Hamilton W. Mabie, in his "Essays on Nature and Culture," says: "Once in a while some discerning man outside of the regular school interests, sees the inconsistencies of educational systems. Relationship with nature is a source of inexhaustible delight and enrichment. To establish it ought to be as much a part of every education as the teaching of the rudiments of formal knowledge, and it ought to be as great a reproach to a man not to be able to read the open page of the world about him as not to be able to read the open page of the book before him."

(Signed) HELEN CHRISTINE BENNETT,
1206 Stiles st., Philadelphia.
Instructor at Children's School Farm.
New York City, 1902-1903.

Philadelphia, January 12th, 1904.

NOTE.—The Children's School Farm in New York City was an original scheme of Mrs. Henry Parsons, a member of the Local School Board of the 11th School District of Manhattan, to whom the writer feels that she owes a lasting debt of gratitude for the training received during the past two summers. The success of the School Garden idea in New York is entirely due to the untiring energy and perseverence of Mrs. Parsons.—H. C. B.

The foregoing excellent article is sent to THE OTTAWA NATURALIST by Mr. R. H. Cowley, who has collected extensive information on the subject of School Gardens. In this connection many of our readers will follow with special interest the Macdonald School Garden experiment which will be inaugurated this spring under Mr. Cowley's direction in the County of Carleton.—J. F.

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THE GRASPING POWER OF THE MANUS OF ORNITHOMIMUS ALTUS,* LAMBE.

By LAWRENCE M. LAMBE, F.G.S., F.R.S.C., of the
Geological Survey of Canada.

(With two plates.)

In the collection of vertebrate remains from the Belly River series of the Cretaceous of Alberta, Canada, made by the writer in 1901, there are a number of phalanges of the manus of *Ornithomimus altus* that throw further light on the structure of this dinosaur and on its probable habits. As little is known of the manus, or indeed of the skeleton generally of the different species of this genus, it is thought that a few descriptive remarks on the phalanges of the Belly River form may prove of some interest.

Of the pes of *O. altus* we already know that it was adapted to swift running and that the digits terminated in long, rather straight, pointed claws.

Five species of the genus have been named by Marsh from the Upper Cretaceous of the Western States. These are: *O. velox* from the "Ceratops beds of Colorado," *O. tenuis* and *O. grandis* from the "same horizon in Montana," and *O. sedens* and *O. minutus* from the "Ceratops beds of Wyoming." Of these species scarcely anything is known of the fore limb. Marsh describes and figures the metacarpals of *O. velox* and a claw bone of the manus of *O. sedens*.

The material collected by the writer does not admit of the reconstruction of the entire manus. It proves that the claws were of quite a different shape from those of *O. sedens*. (Fig 9.)

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*Communicated by permission of the Acting Director of the Geological Survey of Canada.

The Upper Jurassic compsognathoid form, *Ornitholestes hermanni*, lately described by Professor Osborn, shews many points of resemblance to its supposed successor *Ornithomimus altus*. Like *O. altus* it was terrestrial in its habits and a swift runner. The similarity in form of the ungual phalanges of the manus in the two species is strikingly apparent (see figs. 8 and 4). Among the remarkable characters of *Ornitholestes* is mentioned as most distinctive "the narrowing of the manus and the great elongation of the metapodials and phalanges of the second digit, suggesting the rapid grasping power of agile and delicate prey."

Compared with that of *Ornitholestes* the manus of *Ornithomimus altus* is much stouter and less elongated, but it probably had an equally great grasping power. The terminal phalanges curve more rapidly, are proportionately deeper proximally but are less compressed laterally; from those of *Ornithomimus sedens* they differ in being deeper, much more curved and in having a greater lateral compression.

The phalanges of the manus of *Ornithomimus altus* represented in the accompanying figures, 1—6, are presumably those of the second digit; they all resemble those of the pes in being to a certain extent hollow.

The proximal phalanx is about one-third longer than the second one and about the same length as the distal one. Its proximal end is conspicuously enlarged above and at the sides and the articular surface (fig. 1*a*) is evenly concave. The condyles of the distal end are greatly enlarged in a vertical plane and a deep channelling of the articular surface extends in a curve round the end through an angle of about 223°. Posteriorly below a decided roughening of the surface of the bone occurs for muscular attachment.

The second phalanx (fig. 2) is short above but a backward extension of the inferior surface adds greatly to its length below. The proximal articular surface exhibits a sharp vertical keel, on either side of which the bone is well excavated; the distal surface has a decided medium groove extending through an angle of 180°. The enlargement below the proximal articular face combined with a well-defined roughening of the bone suggests great muscular strength at this point. Both these phalanges are laterally compressed and have deep excavations, in the form of round pits, on either side of their distal ends. These pits are more decided on one side than on the other.

The ungual phalanx (fig. 3) is deep proximally, is much compressed laterally and terminates in front in a sharp point that is directed downward when the articular face is in a vertical position. A well-marked claw groove extends, on either side from the upper border at the apex, backward for about two-thirds of the length where it bifurcates, the upper groove reaching the articular surface below the upper border, the lower and deeper one passing downward behind a roughened enlargement of the lower surface for the attachment of the flexor tendon. The bone is rough also on the sides and upper border for a short distance in advance of the articular face. This face is vertically concave with a moderately well defined median keel extending from the lower to the upper margin.

Besides the phalanges of the second digit figured, the corresponding ones of the other manus were also obtained, as well as a few, including distal ones, belonging to other digits, all presumably of the same individual. The additional ungual phalanges are smaller than that of the second digit, are broader in proportion to their length and not so deep (see fig. 7).

In the original description of *Ornithomimus altus* reference is made to the phalanges above described as well as to the distal end of the interrupted first metacarpal, all found within a few feet of each other in the Red Deer river district of Alberta (Belly river series).

Figure 5 indicates the amount of rotation possible of the second and distal phalanges round the proximal phalanx. This is principally due to the extensive development of the distal articular surface of the proximal phalanx and is suggestive of great grasping power.

It may be surmised that *Ornithomimus altus* was capable of rapid motion in pursuit of prey which it had the power of tenaciously grasping with its fore limbs. The claws covering the terminal phalanges of the manus were evidently both long and sharp.

Ornitholestes is supposed to have pursued such "agile and delicate prey" as the Jurassic birds ; *Ornithomimus altus*, also a rapid runner but of larger build, with a more robust manus of a strong grasping capacity, may be supposed to have attacked larger animals, possibly those not unworthy even of the notice of his more bulky and formidable contemporary *Deinodon horridus* of Leidy.

Ottawa, Dec. 23, 1903.

EXPLANATION OF PLATES.

PLATE I.

- Phalanges of second digit of manus of *Ornithomimus altus*, natural size.

Figure 1.—First phalanx viewed from the side ; 1*a*, from behind ; 1*b*, from in front ; 1*c*, from below.

Figure 2.—Second phalanx viewed laterally ; 2*a*, from behind ; 2*b*, from in front ; 2*c*, from below.

Figure 3.—Third or terminal phalanx as seen from the side; 3*a*, from behind; 3*b*, from below.

PLATE II.

Figures 4 and 5.—Lateral views of the phalanges, figured in Plate I, to shew rotation. Figure 5 represents the position of the phalanges when grasping.

Figure 6.—The same phalanges from below.

Figure 7.—Ungual phalanx of manus of *Ornithomimus altus* ; probably that of third digit.

The above figures natural size.

Figure 8.—Terminal phalanx of second digit of manus of *Ornitholestes hermanni*, Osborn, side view ; one-half natural size.

Figure 9.—Terminal phalanx of manus of *Ornithomimus sedens*, Marsh, side view; one-half natural size.

SOME CANADIAN ANTENNARIAS.—II.

By EDW. L. GREENE.

Continuing the study of the Chilliwack Valley material collected by Mr. James M. Macoun in 1901, it becomes more and more evident that the genus *Antennaria* is strongly developed in British Columbia; so much so, that for the western slope of North America it may be said to have there its centre of distribution. And this interesting forecast is further warranted by the fact that, from the vicinity of Banff, Mr. N. B. Sanson has obtained, among other species of the genus, at least two more that are hitherto undescribed.

In attempting to describe the new species, I can not but regret the absence of specimens of the staminate, or male plants; for these have their own characters that help to establish the validity of species; and I would beg of future collectors of British Columbian Antennarias, that they make special search for male plants. They are, it is well recognized, less common than the pistillate; but they should be sought, diligently, at every opportunity.

A. SEDOIDES. Low, loosely matted, rather obviously suffrutescent, the short and slender stolons bearing a rosette of leaves at the end, these scarcely ½ inch long, rather abruptly spatulate-contracted below a very broad and short obtuse terminal part, both faces finely densely and permanently silvery-woolly or satiny; flowering stems only 2 or 3 inches high, very slender but firm, their lower leaves oblong-linear, the upper linear: heads 4 or 5, their involucres with ovate rather acute dull-white scarious tips.

By roadsides at Banff, B.C., 28th May, 1901, N. B. Sanson; only pistillate plants, and these much too young; not even yet in flower. But the rosetted stolons, looking like those of some Sidum, are very characteristic.

A. SANSONII. Short leafy stolons and slender though firm stems closely tufted, the latter 6 or 8 inches high; basal leaves small and very narrow, linear-spatulate, acutish, ½ to ¾ inch long, densely, closely and very permanently silky-woolly, the cauline linear, acute or accuminate, erect ; cymes neither dense nor lax, of 8 or 10 heads of middle size; involucre rather strongly woolly at base, each bract marked with a brown spot at base of the long and conspicuous scarious but faintly pinkish tip, only the innermost tips acutish, the others obtuse, all apt to be a little incised.

A rather neat and elegant firmly erect species, obtained by Mr. H. B. Sanson on the slopes of Sulphur Mountain, near Banff, B.C., 16th July, 1901. It is somewhat related to *A. acuminata*, although distinct enough by its compact habit, and permanently silvery foliage. Even the dead leaves of a former year are not divested of their indument. The type is the Geol. Survey No. 26,857.

A. CHLORANTHA. Low, rather loosely tufted, 3 to 5 inches high, the short stolons not densely leafy, and leaves large for one of the *A. alpina* group, the largest about an inch long, cuneate-obovate to obovate-spatulate, acutish and mucronulate, white with a rather loose and flocculent (not compact and silvery) indument, this deciduous, the leaves of the former year quite glabrous and of a light green ; those of the stem about 4, an inch long, oblong-linear, acute, suberect, less woolly : cyme capitate, the subsessile heads about 5 ; bracts of the involucre with long deep-green scarious tips elongated and mostly acute, the innermost acuminate.

Chilliwack Valley, B.C., at 6,500 feet, by Mr. J. M. Macoun, 23 July, 1901, being No. 26,197 of the Survey ; also apparently the same under No. 26,196, from an altitude of 5,600 feet. All the specimens are too young, and show only the pistillate state, unfortunately; but the species is well marked as to habit, foliage and pubescence.

A. LANULOSA. Habitally resembling *A. chlorantha*, taller, more slender, the stolons rather rigid, sparsely leafy, the leaves smaller, more abruptly narrowed from below the obovate summit, of thinner texture, loosely white-woolly, those of the preceding year glabrous but brown and dead ; cauline linear, acuminate :

cymes large, of 8 to 12 rather large heads; involucres short but well imbricated, the scarious part of the bracts light brown, the outer obtuse, the inner scarcely acute: small achenes minutely glandular-hirtellous.

Chilliwack Valley, B.C., at 6,000 feet, J. M. Macoun, 29 Aug., 1901. Notwithstanding some likeness to the preceding, I doubt if this belongs really to the *A. alpina* group of species. Geol. Surv. No. 26,194.

A. MACULATA. Rather compact, the slender flowering stems only 2 to 4 inches high: short stolons densely leafy; leaves ½ inch long, obovate-spatulate, subcoriaceous, loosely white-woolly when young, glabrate on both faces in age and of a light green; small stem-leaves suberect, varying from spatulate-linear and obtuse in the lower to oblong-linear and acute in the upper: middle-sized heads about 5, capitate-clustred; bracts of the involucre unusually numerous and imbricated, each with a conspicuous dark spot in the middle just below the base of the scarious tip, the tips dull-white, broad and short, the outer acute, the inner obtuse, all irregularly and incisely serrate under a lens.

Also of the Chilliwack Valley, by Mr. Macoun, 29 Aug., 1901, from an altitude of 6,000 feet. The specimens are rather immature, and of the pistillate plant only, unfortunately. The Geol. Surv. number is 26,195.

Washington, D.C., March, 1904.

BIRD NOTES.—On April 26th, I surprised a pair of migrant shrikes (*Lanius ludovicianus migrans*) in the act of making a meal of a song sparrow. Rather large prey for so small a shrike. Their usual food is beetles.

Mr. J. H. Fleming, of Toronto, writes me that he once saw a Connecticut warbler at Ottawa. He being a highly capable observer, this is an addition to the local bird-list.

G. E.

RELATIONSHIP BETWEEN THE WEATHER AND PLANT GROWTH.

A COMPARATIVE STUDY OF THE LAST TWO SPRINGS.

By CEPHAS GUILLET.

During the spring of 1902 and that of 1903—that is to say from the latter part of March to the latter part of June—I have observed about 360 wild plants in bloom in and around Ottawa, 300 of which are natives. I have selected about half, or 170 (all but 27 being natives), as being the most accurately observed during both years as regards their first coming into bloom. For purposes of accurate comparison I have divided each month into periods of ten days, and shall call these periods the first, middle and last periods of the month. When the month has thirty-one days the last part contains eleven.

Of the 170 plants, I find I observed 33 to come into bloom on the same date each year, namely 9 in the middle and 8 in the last part of April; 5 in the first, 5 in the middle and one in the last part of May; and 4 in the first and one in the middle part of June. It will be observed that the synchronous observations are especially numerous in April, half occurring then, and become less numerous as the season advances, there being only six during the last part of May and the month of June If this were all the evidence we had, we might surmise that the two seasons ran more nearly parallel during the first half than during the last, which is unusual.

But the other observations establish this in a more exact and satisfactory manner. Of the remaining 137 plants under discussion only 39 bloomed earlier in 1902, while 98 bloomed earlier in 1903. And of the 39 which bloomed earlier in 1902, 31, or about 80 per cent of them, bloomed in March, April and the first part of May, while of the 98 which bloomed earlier in 1903, only 11 bloomed in the corresponding period. The table given herewith will make this plainer. It shows in a striking way that the season of 1903 overtook and passed that of 1902 before the middle of May.

TABLE SHOWING THE PARALLELISM OF TEMPERATURE AND PLANT-GROWTH DURING THE SPRINGS OF 1902 AND 1903.

	March.			April.				May.				June.				Total.
	First & Middle	Last.	Total.	First.	Middle.	Last.	Total.	First.	Middle.	Last.	Total.	First.	Middle.	Last.	Total.	Four Months.
(*a*) Synchronous observations	....	....	......	....	9	8	(17)	5	5	1	(11)	4	1	....	(5)	33
(*b*) Earlier bloomers of 1902........	....	2	(2)	3	4	11	(18)	11	2	3	(16)	2	1	....	(3)	39
(*c*) ,, ,, 1903.... ...	....	....	......	....	4	3	(7)	4	23	25	(52)	24	15	....	(39)	98
Total number of plants under consideration	....	2	(2)	3	17	22	(42)	20	30	29	(79)	30	17	....	(47)	170
Average lead of (*b*) four days.																
,, ,, (*c*) ,, until the middle part of May, when the lead became (in days)........	....	.. ..	......	....	....	....	......	....	7	10	......	9	8	....	......	......
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
Average maximum temp. in 1902...	37.1	52	(42.32)	50	54.4	62.8	(55.7)	56.6	65.1	70.3	(64.6)	71.6	71.9	67.1	(70.2)	(58.15)
,, ,, ,, 1903....	40	45.5	(42)	48.2	54	62.8	(55)	67.7	81.1	70.8	(73)	80.5	67.8	71.1	(73.1)	(60.7)

Now, looking more closely, we find that the earlier bloomers of 1902 in April and the first part of May were on the average four days ahead of their sisters (or perhaps I should rather say children) of 1903 ; indeed, that is also the average of all the earlier bloomers of 1902. But the earlier flowers of 1903, while surpassing those of the same species in 1902 by only this same number of days in the earlier part of the season, yet in the latter part, *i.e.*, after the 10th of May, blossomed on the average between eight and nine days earlier than their representatives of 1902. This means that the season of 1903, which began and continued for a time four days behind that of 1902, rapidly gained twelve days on that season in the middle part of May, and held this position well on into the month of June at least. For I find that the average lead of eight days is pretty constant throughout the four periods from the 10th of May to the 20th of June, being seven, ten, nine and eight days respectively.

To anticipate the objection that these observations, while all of the vicinity of Ottawa, were not always of exactly the same locality for the same species, I selected those of the observations to which this objection could not be taken, and found that the result was substantially the same. The average for the period named is eight days, and for the different parts of that period seven, nine, eight and eight respectively. This indicates that, for example, when a given plant is blooming in Beechwood, it is likely to be blooming in Billings Bridge too ; and when you find a certain species in bloom in Beechwood swamp, you may confidently look for it in bloom in Dow's or in the Britannia swamp, if it is to be found there at all. While this may be taken as the rule, there will doubtless be found localities where the conditions of soil or location are distinctly peculiar. Chelsea, for example, is situated on a southern mountain slope some two hundred feet above Ottawa; the spring plants will be earlier there. Blueberry Point, on account of a certain peculiarity of soil and flora, is also possibly an exceptional spot. It is safer to compare such places only with themselves in one's phenological comparisons. When possible, I have always used preferably observations from the same locality, and, in the case of trees, from the same tree.

Sports, also, must be excepted from such comparisons. Of these I found at least two striking instances. One plant of the common wild strawberry, *F. virginiana*, was in bloom some ten days before its sister plants in 1902, namely on the 11th of April; and on the 17th of April, 1903, I found one Canada violet expanded, while I found no others anywhere till eight days later. Both these plants are still growing and blooming late in the fall; and winter had in this case probably caught both of them in bud, Thus the strawberry, being a perennial, and the Canada violet, protected by the thick snowy garment, acting probably as a winter annual, were both ready to proceed and open their blossoms as soon as Winter released his grip.

To account for the remarkably sudden and rapid advance in the growth of the plants last May, we should naturally infer that there must have been some remarkable phenomenon in the weather of that month. In order, then, to ascertain this accurately and to see whether the conclusions from my observations of the Comparative Phenology of 1902 and 1903 were borne out by the Comparative Meteorology of these two seasons, I, after writing the above conclusions, applied to the weather bureau for a statement of the progress of the weather during the periods named, and particularly of the temperature and rainfall. These were courteously furnished me by the Deputy Minister of Marine.

Comparing first the daily maximum temperature for the two seasons, it came out that while the maximum daily temperature of March was just about the same in both years, namely 42.3° in 1902, and 42° in 1903, yet it was better distributed to stimulate growth in 1902. For, while the first eighteen days were the same in both months, the next two days were unusually cold in 1902 and unusually warm in 1903, and consequently the rest of the month, *i.e.*, the last third, the important part for vegetation, was on an average 6.5° warmer per day in 1902, being 52° in 1902 and 45 5° in 1903. This gave that year a slight advantage at the start, which was seen in the blooming of hepaticas, for example, on the 28th March, 1902, and on the 30th in 1903; and of the silver maple on the 26th in 1902 and the 29th in 1903. This slight advantage in favor of 1902 was increased during the first third of April which was warmer in 1902 by 1.8° per day. During the rest of April, 1902 had a slightly higher average daily maximum temperature, so that 1902 would naturally retain its lead. But the last four days of this month were on an average considerably warmer (6.7° per day) in 1903, and this continued the case throughout the two following months except in the second part of June.

It was in the closing days of April, therefore, that 1903 began to gain on 1902, and the rapidity with which it overtook and passed 1902 is readily explained by a comparison of the temperatures in May. During the first five days 1903 was only warmer by 1.4° per day. but during the next five days by 18° per day! It was evidently during those five remarkably warm May days that the vegetation of 1903 overtook that of 1902. During the second third of May the days were 16° warmer than in 1902, or almost as much warmer as during the second five days, thus accounting for the remarkable spurt in vegetation in the middle of May, 1903, which my observations showed to exist. That last season's lead should have continued and even increased in the last third of May, is again explained by the fact that the daily maximum temperature during this period was higher in 1903 by .5°. But, although the temperature was still warmer in the first part of June, 1903, as compared with 1902, by 9°, yet there was a falling off of one day in the lead of the vegetation of 1903. Some other controlling factor seems to have operated here. During the middle part of June the maximum temperature of 1903 was less than that of 1902 by 4° per day. This change is indicated by my observations, which show a lead of eight days during this ten-day period as against nine for the previous period.

The daily *minimum* temperature, though of course not so good an index of plant growth, yet tells in a general way the same story. In both the years under consideration the average minimum daily temperature was below the freezing point up to and including the 6th April. After that date there were only five days in 1902 when the minimum fell to or below 32°, the last time being the 11th of May;* whereas in 1903 this occurred fifteen times, the last frost being, however, earlier (the 6th of May) and not severe. The minimum temperature throughout April was also considerably higher in 1902 than in 1903. So that here again we see the early part of the spring of 1902 to have been a more favorable season for growth than that of 1903.

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* It might be pointed out in this connection, that, as the flow of the maple sap through the tap-hole is dependent upon the fluctuation of the temperarure above and below the freezing point, or 32° F., the sugar season around Ottawa must have practically ceased on the 6th April in 1902.

But, while there was very little frost in the spring of 1902, there was one exceptionally severe frost, and that so late as the morning of the 10th of May, when the thermometer went down to 21° above zero. This frost did considerable damage to vegetation and must have retarded growth. One Arbor Day we had planted in the same spot at my school round leaved and red osier dogwood shrubs from Rockliffe, and they grew luxuriantly. This frost of May the 10th, 1902, nipped the round-leaved dogwood, withering all its leaves, but spared the red osier growing with it. I noticed that it also spared the alder. But, partly, no doubt, because of their nearness to the ground, it played havoc with many herbs. The early lily and lily-of-the-valley families, in particular, were badly wilted and blackened. I found no *Clintonia* in bloom that season, owing, I thought, to the frost.

While in March the minimum daily temperatures ran roughly from 20° to 35°, and in April from 30° to 40°, in May and June they ran from 40° and 45° respectively to 60°. But dividing the months into three periods, it is found that the average minimum temperatures for the three parts are roughly 40°, 40° and 50° in May 1902, but 40°, 50° and 50° in May, 1903; and 40°, 50° and 50° in June, 1902, but 50°, 50° and 50° in June, 1903; showing that the middle part of May and the first part of June were much colder in 1902 and that the month of May, 1903, had about the same minimum temperature as the month of June 1902. This reinforces our previous conclusions regarding the phenomenal growth in May, 1903.

I was struck with the steadiness and evenness of the rise of the minimum as compared with the maximum temperature: a fact due to the constancy with which the earth absorbs heat and the tenacity with which it retains it, as compared with the rapidly waxing strength of the sun's ever more perpendicular rays, much of whose heat, however, is often intercepted and irradiated by clouds and winds, or absorbed in the evaporation of rain. The average minimum temperatures of every ten days of May and June, 1903, were respectively 37.8°, 51.8°, 51.1°, 52.6°, 51.8° and 53.3°; while the corresponding maximum temperatures were 67.7°, 81.1°, 70.8°, 80.5°, 67.8° and 71.1°. It was in May that the most rapid rise in minimum temperature took place, namely that from about 40° to about 50° during the middle of May, 1903, and the latter part of May, 1902.

Comparing now the rainfall of the two seasons, we find that there is a marked difference in the amount and still more in the distribution of precipitation. It 1902 it amounted during the four months under consideration to 12.32 in.; in 1903 to 8.97 in. Or, leaving out of account the last third of June, which my plant-observations do not cover, 10.65 in. and 5.06 in.; that is more than twice as much rain in 1902 as in 1903 for the period covered by my observations. In 1902 the rain was well distributed, being for March, April, May and the first two thirds of June 3.47, 2.74, 1.82 and 2.62 inches respectively, which is not very different from the average for 20 years. But in 1903 the figures are 1.35, .95, .12 and 2.64 inches. In 1903, therefore, there was comparatively little precipitation in the spring before June, and next to none in May; and even in June the rain did not fall in any appreciable amount until the 12th, when it rained 1.59 inches and continued rainy throughout the rest of the month. Furthermore, there was no rain in April after the 7th. In fact from the 8th April to the 11th June inclusive there fell only .22 in. of rain! That period, therefore, of over two months' duration, was literally one long drouth. Occurring as it did, however, so early in the year, when the ground was saturated with the winter snows, its effect was, as we have seen, to force vegetation forward rather than to retard it, *until towards the end of the drouth.* For we found that, in spite of the fact that the weather continued warmer, and indeed increasingly warmer in the first part of June, 1903, as compared with 1902, yet there was an actual falling off in the lead of 1903 over 1902 in plant-growth during that period, when the average daily temperature was 7° higher in 1903.

I was not surprised at this result, as I remember noticing the blighting effect of the drouth on certain of our wild plants. I noticed *Unifolium Canadense* in bud as early as the 29th of April. On the 15th May I have the following note: "Most of the bunches of buds of *Unifolium Canadense* have shrivelled up; others—lately developed probably—are about ready to open, but rain is needed!" The flowers expanded about a week later. This was in Beechwood Cemetery. At Chelsea they came into bloom about a week earlier than here and at the same time as the previous year but not so abundantly. Wild columbine, which already had large buds on the 27th April, seemed to be affected by the drouth, being very slow in opening its buds in May. In the middle of May, 1902, I found plenty of *Capnoides sempervirens* in bloom on the rocks of the island at Chelsea ; at the same time last year I could find no trace of the plant. I found *Anemone riparia* in bloom in abundance at the Beaver Meadow very early in June, 1902 ; last year I did not find it there at all. Several plants found blooming in the lane near the bridge at Beaver Meadow, Hull, in 1902, were not to be seen there in 1903, as *Sedum acre* and *Capnoides aureum*. *Iris versicolor* was abundantly in bloom in the swampy ground near by very early in June, 1902, but not last year. I found *Trifolium aureum* earlier in bloom last June than the previous June, but its growth was stunted. Twin-flower and the pitcher plant were burnt brown by the heat where exposed. The drouth had probably something to do with all these failures.

At the end of April, 1902, I found *Draba nemorosa* pretty abundantly in bloom along the river bank at Tétreauville, and before many days its little yellow flowers covered the ground. Last year I was unable to find the plant at all. The dry spring was probably unfavorable to its growth. Prof. Macoun, to whom I am indebted for much cheerfully given help in this investigation, told me that *Draba nemorosa* had been found only once before around Ottawa, namely in 1900 by himself near the St. Louis Dam. Other rare plants I found in bloom in 1902 are *Cynoglossum virginicum*, 17th June, at Tétreauville ; *Symphoricarpos racemosus*, 28th June, at Rockliffe; *Heracleum lanatum*, 28th June, near the mouth of the creek draining Hemlock Lake; and in 1903, 25th May, *Corallorhiza corallorhiza* at Britannia.

It was not the purpose of this paper to compare these two seasons in detail with the preceding. I have also not dealt with bird-migration, which is another interesting index. Suffice it to say that my plant notes and bird notes, and the weather records kindly furnished me by Mr. Stupart, the director of the meteorological service, alike show these last two springs to have been both unusually early. Both had in March and April almost the same mean temperatures, which were in March 10.9° (1902) and 11.4° (1903) higher than the average for twenty years,* and in April 4.5° (in 1902) and 2.9° (in 1903) higher than the normal. And the hot, dry month of May, 1903, of which we have spoken at length above, was 3.6° hotter than the normal, while May, 1902, was 1.7° cooler than the normal, and June of both years cooler than the average by 4.4° and 2.4° respectively.

Comparing the past two springs with the previous two, we see again how remarkably early they were. The mean monthly temperature of March, in 1900, was 18.6°, in 1901 it was 24.3°, while in 1902 it was 33.9° and in 1903 34.4°. It is little wonder that hepaticas and silver maples bloomed earlier in 1902 and 1903 than in 1900 and 1901. But why they should have bloomed from two to three weeks earlier is not so apparent, when we consider the interesting fact that the *temperature of April was about the same for all four years.* But happily we are not left without an explanation, which lies in the state of the soil. In the falls of 1901 and 1902 snow fell early and steadily before the frost had entered the ground, consequently there was no frost in the ground to retard vegetation when the snow went off in the spring. In the previous two years the conditions were precisely the contrary: the frost got well into the ground before the frost came, so that the succeeding springs of 1900 and 1901 were much retarded not only by the slowness with which the snow melted in those cold, ice-bound Marches, but also by the frost in the ground under the snow tending to delay growth.

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* These mean temperatures are somewhat higher than that of March, 1898, which was the warmest March of which we have any record prior to 1902, its average maximum temperature even exceeding those of the Marches of 1902 and 1903 by a small fraction of a degree, being 42.36°. Miss V. Lees informs me that she found hepaticas in bloom on Pine Hill, New Edinboro', on the 27th of that month, which is the earliest record for hepaticas of which I have heard. While this article is printing I am able to state that this spring hepaticas have not, so far as I know, been found in bloom earlier than the 16th April, and up to to-day (23rd April) I have seen no other wild plants in bloom. Till to-day the temperature has not reached 50° One swallow does not make a summer, nor one hepatica a spring !

It is not to be expected that two springs so unusually early, two Marches of so remarkably high a temperature, will be followed by a similar one. One of the conditions that make for the early growth of plants is certainly present. I have found, by digging down through the three feet of closely packed snow and ice in the woods, that the ground there is not frozen though it is in the open field. Therefore, when the snow disappears, or, indeed, before that, plant-growth will be possible in the woods. But the snow this year is of unusual depth,* and will be longer in melting, not only because there is more to go, but because the very presence of such a mass of frozen matter makes for lower temperatures. It is probable, however, that when spring does come it will come in with a rush and be a rapid season. For with temperature, as with other things, there is always a tendency to rhythm, to wave-motion ; so that, as we are having temperatures so constantly, so phenomenally low this winter, we may expect unusually high temperatures later on. Although a cold winter does not always presage a warm spring (it did not in 1875, the coldest winter on record, nor in 1883, nor in 1885), yet it is not usual, Mr. Stupart informs me, to have more than three consecutive months below normal. In dealing with the weather, however, it is certainly easier to be wise after the event. Long forecasts regarding the weather, indeed, partake rather of the nature of guess work than of true prophesy. The conditions affecting weather are so numerous, complex and remote, as to make meteorology the most difficult and the most backward of all sciences, not even excepting physiology.

Finally, comparing the spring drouth of 1903 with previous drouths at that season, we see how phenomenal it was. Mr.

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* As this article is being printed, I have ascertained the snowfall of the past winter to be 105.7 inches, which is 8.8 inches above the average for thirty years. Even this heavy snowfall did not everywhere protect the ground in the open during the past severe winter. The snowfall of the previous winter was unusually light, being but 72.9 inches.

Stupart has kindly furnished me with a record of the dry April-May periods of the past thirty years. They are as follows :—

1876--2.15 inches of rain.
1879—2 64 "
1896—3.10 "
1898—3.21 "
1900—3.76 "
1903—1.07 "

It is certain, therefore, that the drouth of 1903, lasting from 8th April to 11th June, during which only about a fifth of an inch of rain fell at Ottawa, is easily the driest spring on record. It is remarkable how little harm it did, which shows how well fitted our finely watered district is to withstand drouth. As an instance, however, of the fact of compensation, of the fact that things do tend to average up, it is worth mentioning that, in spite of the long drouth in the Ottawa Valley last spring, the precipitation here for the year 1903 was only one inch below the average mean of 33.6 inches; and the additional fact that in revenge for the unusually hot May we had an unusually cool summer. The hottest day last year was the 19th of May, when the thermometer registered 90° in the shade. The average annual maximum temperature of Ottawa is 93.8°. July, which, as is usually the case, was the hottest month, exceeded May in average maximum temperature by only 3.7°. August had a lower maximum than May.

It is well known that plant growth is dependent upon meteorological conditions and particularly upon temperature and rainfall ; but that the dependence is so absolute, that the parallelism is so true and delicate as even these few observations with all their liabilities to error yet indicate, was to me very interesting and gratifying: interesting as the spectacle of the orderly reign of law must be to everyone who studies it ; and gratifying, as proving that my observations, which I was, to tell the truth, a little fearful of putting to the test, must have been fairly accurate.

Such a study tends to clarify one's ideas regarding many interesting phenomena That the plants, instead of all springing up together at the first blush of spring, should range themselves, so to speak, in a procession throughout the season, is partly due to their varied sensitiveness to heat, as well as to their more or less favorable situation for receiving the heat. The sensitiveness of our wild plants to heat has been determined in very few cases. In our hemlock, the lowest temperature at which the chlorophyll-corpuscles turn green is between 44.6° and 53.6° F. The decomposition of carbon dioxide with evolution of oxygen begins in potomogeton between 50° and 59°, and in the eel-grass above 42.8°. Even the most sensitive, *i.e.*, the most prompt to react in this way, as the larch and meadow-grass, require a temperature above the freezing point, between 32.9° and 36.5° in the case of the larch, and between 34.7° and 38.3° for the meadow-grasses. From our observations we might reasonably infer that silver maples, hepaticas, spring beauties and the trailing arbutus, all of which have been found *blooming* in March in one or both of the last two springs with a maximum temperature of about 50°, rank with these in readiness to react to heat stimuli; while golden-rod, asters and indeed most of the Composite family must require a great deal of heat. On the 6th of April, 1903, after several cool days and frosty nights, I have this record : "Still cool and cloudy; no growth." In going about the streets and the woods I had noticed little or no change in the vegetation those days. The aspen and alder catkins, which I noticed well shaken out on the fifth, did not begin to shed pollen until the ninth, which was a fine mild day, the temperature reaching 56°. The habit of the plant as regards the order of growth of stock leaves and flowers is another factor conditioning the time of blooming. Plants such as the hepatica, trailing arbutus, early coral-root, silver maple, alder, aspen, hazel, and glaucous willow, which in the spring devote their new-found energies of growth to the unfolding of flowers-buds already formed the previous year, will naturally bloom early; while those which, like the golden-rod and oak and ash, attend first to the growth of stock and stem and leaves will naturally bloom relatively late.

A word might be said here regarding the time when the various orders and families of plants come into bloom. During April in these two exceptionally early springs I found 75 species of plant in bloom, including two grasses and six sedges. Leaving out of consideration the sedges and grasses, which I observed only in April, I find that the chief blossoming-time for our flowering plants is the end of May and the beginning of June. During the last third of May and the first third of June I found 136 plants coming into bloom, or exactly 68 for each period. This is about 40% of the whole number found blooming before the end of June. In every ten-day period before this, the numbers gradually increase towards this climax, while they fall off thereafter. I found no violets come into bloom after May and very few of the lily and lily-of-the-valley families; they are found from the middle of April on. On the other hand the St. John's Wort family, which belong to the same order as the violets but have a different habitat, come into bloom in July. The poppy family has some April representatives. The poplars and willows, elms and maples bloom early; indeed most, if not all, of our trees are in bloom before June. The irises and orchids do not bloom before May. The order of the *Ranales* and the rose order begin to bloom early and furnish a great number of species, perhaps 80% of their number, throughout April, May and June, beginning with the hepatica, our earliest flower. Much the same may be said of the cress or mustard family (which begins with the cut-leaved toothwort) and the heath order (beginning with the trailing arbutus, almost, if not quite, as early as the hepatica) though they are not quite so abundant in the beginning. The cress family may nearly all be found in bloom before the middle of June, while quite a number of the heath order bloom in July. The pink family and the umbel order have each only one representative in the latter part of April, viz., the larger mouse-ear chickweed (*Cerastium vulgatam*) for the former, and the dwarf ginseng for the latter; but soon after they become very abundant, especially the umbel order. The more highly developed plants seem to be, as a rule, poorly represented in the spring, being largely summer bloomers, which would suggest that their greater complexity required time to unfold. I refer to the primrose, borage, mint, potato and figwort families, the gentian order, and especially the great order of the *Campanulales* which includes the numerous *Composite* family. Of the *Rubiales* I found only one species of galium blooming in May, but six in June; *mitchella repens* also is not found till towards the end of June; but the honeysuckle family, while furnishing but one plant blossoming in the latter part of April (the 30th), furnishes many in May and June. The earlier plants of spring are mostly woodland or (generally rather later) swamp plants; which, not requiring much heat, find the moist and shady woods or the cool, wet swamps a favorable habitat. Such are, for the woods, the violets, the lilies, the early poppies, the saxifrages and mitreworts, strawberries and hepaticas; and for the swamps and wet places, many orchids, irises, cresses and speedwells, etc. Towards the end of spring the flower-lover will find the woods comparatively bare of flowering species and will turn to the sunny shores of lake and river, both in the water and on land, where will greet him water plants of many kinds, and spiræas, button-bush, St. John's wort, loosestrifes, bluebells, epilobiums; and to the clearings, the fields and roadsides, where he will find roses, raspberries, peas and clovers, and finally mallows, mints, gerardias, lobelias, gentians, thistles, beggar-ticks, sunflowers, golden-rods, asters, and in short all those highly-developed plants which delight to bask in the direct rays of the sun.

The weeds, with very few exceptions, are late bloomers, which may be explained by the fact that they are mostly annuals, springing from the seed which has lain dormant until awakened by the warmth of spring. There is therefore considerable growth necessary before flowers can be produced and this takes time. The following weeds, however, I found blooming in April: the European strawberry, shepherd's purse, Buxbaum's speedwell and the dandelion. Of these the strawberry and dandelion are perennials that bloom continually throughout the season, and only suspend growth while the unfavorable winter conditions last. They are therefore ready to go on blooming early in spring. The shepherd's purse is a winter annual, germinating and vegetating in the fall, and so ready likewise to bloom early in the spring. The other weed that I found blooming in April, namely Buxbaum's speedwell, may possibly also have acted as a winter annual.

I might add that having found plants in bloom in March and well on in November. there are only three months when one need never look for wild flowers around Ottawa, viz., December, January and February. And I am not so sure that dandelions, or sweet clover, or *Linaria linaria*, popularly known as butter-and-eggs, might not be found still blooming at the beginning of December some very late fall in favorable situations. But the only way to see our wild plants in bloom in the middle of winter is to dig them up and bring them home in the fall. I have got sweet cicely to bloom in this way, and my pupils were able to have hepaticas and spring beauties in flower at Christmas-time,—a charming little bit of the spring woods ! It can not be said of all Canada, however, that wild flowers never bloom in February in their own habitat; for on the British Columbia coast, under the influence of the warm Pacific current, at Chilliwack and Vancouver for example, spring opens in the latter part of February with the blossoming of willows and alders ; while on Vancouver Island there is hardly any cessation of growth at all during the winter, and a great many species of wild plants may be found blooming in February.

That seeds long dormant should suddenly germinate and grow luxuriantly when the frost cover is removed, is doubtless due to the great amount of heat, and possibly light, necessary to the germination and growth of these plants—an amount that does not exist in the shade of the poplars, spruces and pines. When these trees grow up again, the heat-loving willow-herb and golden-rod, blueberry and raspberry die away, leaving their seeds, or in some cases the roots, to represent them and to assert their rights when the proper heat-stimulus is again present. The need of oxygen for the germination of the seed is also a factor here. The clearing away of forest cover allows a freer circulation of air, and the oxygen in the air has a better chance to come into contact with the dormant seeds.

Finally, it would appear from this study that the vegetation of a given region would be just as true a criterion of its climate as the climate would be of its flora. They are converse propositions. And plant-growth, being really the resultant of the complex conditions making up what we call *weather*, is thus a very simple and beautiful index of the progress of the seasons.

February, 1904.

MEETINGS OF ENTOMOLOGICAL BRANCH.

Meeting No. 11 was held at Dr. Fletcher's on January 14th, 1904.; seven present. Dr. Fletcher explained that the meetings had been interrupted for several months, owing to absence of members and to other causes, but that in resuming them it was recognized that they were of much value to the members, upon whom he called to set forth the results of their past season's collecting and observations. Mr. Gibson read a paper on "An Interesting Enemy of the Iris," in which he described the larva of *Macronoctua onusta*, which had infested the stems of irises at the Experimental Farm. Dr. Fletcher instanced, among such stem-boring caterpillars, the larva of *Gortyna purpurifascia* which had in a previous season greatly infested their columbines. Mr. Gibson said that larvæ of the rare *Apantesis superba* (var. *nevadensis*, Dyar's List) had been received from Vernon, B.C., and had been successfully reared. Of six caterpillars, two had been inflated and four bred to the moth. Larvæ of *A. docta* (var. *arizonensis*) had also been received from Phœnix, Ariz. Dr. Fletcher spoke of the value of the chitinous head-case of some larvæ as of even greater value than the skin in determining the number of the moult of the caterpillar. In reply to an enquiry by Dr. Sinclair as to the chief value of breeding these forms, he explained that one of the principal aims of such studies was to ascertain that stage in the life of the insect in which injurious forms might be most easily and economically destroyed. The habits of various cutworms were mentioned, and the remedies, such as bunches of poisoned weeds, etc., which might be applied to check their depredations. Mr. Metcalfe exhibited a collection of Homoptera, chiefly the smaller leaf-hoppers, which he had made at Brockville during the summer. There were about forty species named by Mr. Van Duzee, and many of these were represented by long series of carefully mounted specimens. He also showed samples of the curious little Chrysomelid beetle, *Exema dispar*, which is obtained from goldenrods by using a sweeping or beating-net, and which probably escapes many enemies by its marked resemblance to the excrement of caterpillars. Mr. Baldwin showed the results of some recent outings, among which was a *Bombus ternarius* impaled upon a thorn by a shrike. Dr. Fletcher described the success which he and Mr. Gibson had attained in breeding the rare moth *Apocheima rachelæ.* Two of the hairy wingless females were shown alive, and mounted examples of the delicately colored, winged males, with inflated larvæ in all stages. The various stages of *Leucobrephos middendorfii* were also shown. Dr. Sinclair spoke of the opportunities afforded to naturalists by the country surrounding his summer residence in Muskoka, and some discussion followed on the flora and fauna of that region, and on the occurrence of rattlesnakes in Canada. Dr. Fletcher briefly outlined his summer lecture tour in Manitoba, the Territories and British Columbia. The ascent of Mt. Cheam had been a disappointment, as unusually bad weather prevented any effective collecting. A couple of days were passed at Kaslo, B.C., where Dr. Dyar with two assistants had spent several weeks, making large collections of lepidoptera and breeding about 200 species. The new Moth Book published by Dr. Holland was examined and much admired by the members.

SUB-EXCURSION.—The first outing of 1904 took place on Saturday, January 23rd, at the Experimental Farm, when eight, including two ladies, turned out on snow shoes, to see how things appeared in mid-winter. The tramp was through the arboretum to the canal, returning by a circuit again through the aboretum. The great depth of snow offered little chance for collecting, as all smaller forms of vegetation were buried, and the finds were limited to some cocoons and galls. A very pleasant and instructive hour was passed, however, in examining the trees, and appetites were sharpened to do justice to a good hot supper prepared by the host and his assistant.

MEETING NO. 12 was held at Mr. Harrington's, on Jan. 26th, 1904 ; five present. Mr. Gibson read an interesting paper entitled "A Night's Collecting at Meach Lake," descriptive of a visit paid by him to Mr. Young during the summer, and mentioning some of the most important moths which had been taken at sugar and light. The neighbourhood of the lake has always proved productive to all naturalists who have attended the Club excursions, and Mr. Young during two summers spent there has made extensive collections. Fourteen species of the rarer moths were shown. Mr. Metcalfe exhibited a neatly mounted collection of flies, mostly small species, consisting of about 500 specimens, which he presented to Dr. Fletcher, for the museum of the Experimental Farm, to the collections in which it will be a valuable addition. Mr. Harrington showed two large pupal cases, apparently of a Hepialus, which he had taken from an old maple tree on the Aylmer road. He also exhibited two boxes of insects in various orders taken during 1903, and containing several species as yet undetermined. Dr. Fletcher exhibited a female *Mantis carolina* which he had kept living for some time and whose rapacious habits he graphically described. Mr. Harrington referred to a larger species, equally voracious, which he had frequently observed in Japan. Mr. Baldwin showed some galls from willows and raspberry.

MEETING NO. 13.—Held at Mr. Gibson's on February 10th, 1904 ; eight present. Mr. Baldwin showed some recently collected cocoons of moths, also of the sawfly *Trichiosoma triangulum*, and of spiders. Mr. Metcalfe submitted a list of 43 species of hemiptera, representing 34 genera, taken at Brockville, Aug.-Nov., 1903. Mr. MacLaughlin stated that, while unable to do any collecting, it appeared to him that there was an unusual scarcity of dragonflies last year, due probably to the excessively dry spring. Dr. Fletcher referred to the immense swarms of a species of Gomphus which had appeared in Ottawa some years ago, and which had not since been observed in any special abundance. He also spoke of the myriads of dragonflies seen by him last summer upon the North-west prairies, chiefly *Diplax rubicundula* and *D. costifera*.

Mr. Harrington exhibited a case of Ottawa Buprestidæ, containing about 40 species of these destructive beetles, and read a paper giving the dates of appearance and notes on the habits of the various species ; regarding the majority of which much is to be learned. Dr. Fletcher had found *Buprestis langii* abundant in the upper country of Alberta and British Columbia upon the bracken fern. He also reported that a species of Agrilus had recently become a serious enemy to the birch. A white birch tree near his house had been killed apparently by this insect, but as the beetles emerged during his absence he had obtained no specimens. Mr. Harrington thought it might be *A. obsoletæguttatus*, of which both sexes had been taken upon birch. Some discussion followed as to the duration of the larval stage of Buprestidæ and on retarded development in these and other insects, due to deficient heat, moisture or food, or to causes not yet understood. Mr. Young showed a hawk-moth, *Cressonia juglandis*, and described a curious crepuscular flight of the males, which he had observed at Meach Lake; the moths flying too and fro across a patch of smooth water and repeatedly dipping the tip of the abdomen in the water. He also showed *Thecla læta*, a little blue butterfly, new to the Ottawa list, and which is a well known cotton pest in the Southern States. Dr. Fletcher exhibited, as a really rare insect, the fine moth *Hepialus thule*. This species was described from a specimen taken some years ago at Montreal, and so far it has not occurred elsewhere. It is stated to fly only between 8 and 9 o'clock, p.m., during the brief period of its winged existence. Dr. Fletcher also read some extracts from proofs sheets of the Entomological Record for 1903 (Rept. Ent. Soc. Ont.), which indicated that entomologists, especially in the Western provinces, had made many good captures during the year and had largely added to our knowledge of Canadian insects. Mr. Gibson said that in 1991 eggs of a then undescribed arctian moth had been received from Mr. Cockle of Kaslo. Last year similar eggs had again been received and the moths had been bred. Dr. Dyar had also bred the species at Kalso and had named it *Diacrisia kasloa*. Inflated larvæ, pupæ and five imagos were exhibited.

W. H. H. (Sec.)

MEETING OF THE BOTANICAL BRANCH.

The first meeting in the new year was held at the residence of Mr. A. E Attwood on January 7th. Those present were Dr. J. Fletcher, Prof. J. Macoun, Dr. C. Guillett, Mr. E. R. Cameron, Mr. W. T. Macoun, Mr. R. B. Whyte, Mr. J. M. Macoun, Mr. D. A. Campbell and Mr. Robert Hamilton.

By special request Mr. W. T. Macoun read a very graphic description of a trip made by him several years ago up Mount Arrowsmith, Vancouver Island. The reading of the paper was followed by some very interesting and amusing reminiscences by Prof. Macoun and Dr. Fletcher, who have also made the ascent of this very picturesque mountain.

Mr. E. R. Cameron read an extract on "Weeds" from John Burroughs' "Pepacton" in corroboration of what Prof. Macoun had stated on that subject at the previous meeting.

"It is a fact," writes Burroughs, "that all our most pernicious weeds, like our vermin, are of Old World origin. ....We have hardly a weed we can call our own; I recall but three that are at all noxious or troublesome, namely, milkweed, ragweed and golden-rod."

Some time was spent discussing a question asked by the chairman: "Why are the plants of my window-garden not thriving better?" Lack of success with potted plants in an ordinary living-room may be due to unsuitable soil, injudicious watering, dryness of the atmosphere, the presence of dust and insects on the plants, insufficient sunlight, inadequate development before bringing into the house, or worms in the soil.

As an outcome of the discussion on the management of potted plants, it was decided to prepare a list of books that would be of assistance to the amateur and professional lover of plant life. The following may therefore be considered as a select bibliography of guides in the identification and cultivation of plants.

I.—BOTANICAL KEYS.

An Illustrated Flora of the Northern United States and Canada. Britton and Brown. 3 vols. $9.

Field, Forest and Garden. A Simple Introduction to the Common Plants of the United States east of the Mississippi—both wild and cultivated. Asa Gray.

Manual of the Flora of the Northern States and Canada. Nathaniel Lord Britton, Ph.D. 1080 pp. $1.50.

Manual of the Flora of the Northern States and Canada. New edition. (In preparation.)

II.—POPULAR BOTANICAL GUIDES.

Our Northern Shrubs and how to Identify them. Harriet L. Keehler. 500 pp. 240 ill. $2.

Handbook of the Trees of New England with Ranges throughout the United States and Canada. Lorin L. Dame and Henry Brooks. 200 pp. 87 plates. $1.

Trees, Shrubs and Vines of the North-eastern United States. H. E. Parkhurst. 250 ill. $1.50.

Our Native Trees and how to Identify them. Harriet L. Keehler. 500 pp. 340 ill. $2.

Studies of Trees in Winter. A Description of the Deciduous Trees of North-eastern America. Annie Oakes Huntington. 190 pp. 80 ill. $2.50.

A Guide to the Trees. Alice Lounsberry. 312 pp. 64 col. ill, 164 bl. & wh. ill. 54 dia. $2.

Nature's Garden. An Aid to a Knowledge of Our Wild Flowers and their Insect Friends. Neltje Blanchan. 400 pp. 80 ill. $3.

How to Know the Wild Flowers. Frances Theodora Parsons (Mrs Dana). 48 col. ill. $2.

A Guide to the Wild Flowers. A description of 500 plants. Alice Lounsberry. 347 pp. 64 col. ill. 100 bl. and wh. ill. 54 dia. $2.

Mushrooms, Edible and Poisonous, with recipes for cooking, and the chemistry and toxicology of mushrooms. Prof. Geo. F. Atkinson. 320 pp. 230 ill. $3.

The Mushroom Book. Nina L. Marshall.

Our Ferns and their Haunts. Willard Nelson Chute. 332 pp. 200 ill. $2 15.

How to Know the Ferns. Frances Theodora Parsons (Mrs. Dana). 150 ill. $1.50.

Ferns. A Manual for the North-eastern States. C. E. Waters, Ph.D. 362 pp. 200 ill. $3.

Sylvan Ontario. A Guide to our Native Trees and Shrubs. Dr. W. H. Muldrew, B.A. 131 leaf-ill.

III.—WORKS ON PLANT CULTIVATION.

The Window Flower Garden. Julius J. Heinrich. 120 pp. Illustrated. 50c.

Home Floriculture. A Practical Guide to the Treatment of Flowering and other Ornamental Plants in the House and Garden. Eben E. Rexford. 300 pp. 72 ill. $1.

Garden-Making. Suggestions for the Utilization of Home Grounds. L. H. Bailey. 417 pp. 256 ill. $1.

How to Make a Flower Garden. A manual of practical information and suggestions. A charming book by experts on every branch of the subject. 370 pp. 200 ill. $2.

NATURE STUDY—No. XIII.

NATURE STUDY IN THE WINNIPEG SCHOOLS.

By J. B. WALLIS, Supervisor of Nature Study. Winnipeg.

For some years there have appeared on the Programme of Studies for Manitoba a number of suggestions as to subjects which might be classed as Nature Study. Such was Agriculture, which took the forms of a small box of chemicals and of colored plates of some common Manitoban flowers and weeds. These had a definite value ; but the teachers did not know exactly what was required of them, and too often the experiments in agricultural chemistry were allowed to degenerate into an hour's amusement; and the colored plates were put away in a drawer, or were used to decorate the school walls. It is safe to say that Nature Study as we know it to-day, had then no place in the work of the schools. In a few cases, a teacher, herself enthusiastic, would arouse the enthusiasm of her pupils about Nature ; but, even then, it was usually done with little thought of the curriculum. The trouble was, the work was too indefinite ; and it remained for the committee which completed its labors last year, to place on the Programme of Studies a series of definite topics which covered the whole range of the subject as understood by its most advanced advocates.

Even then, the troubles had by no means all disappeared. The teachers were frightened of the work. Arithmetic, history, etc., they could teach ; but this new work, which they were not to *teach* was, even with its assigned topics, something altogether different.

The Winnipeg School Board realized this, and appointed a supervisor of Nature Study for one year. In that time, they considered the subject should be on a firm basis and the teachers all able to continue the work without further supervision.

The plan was inaugurated last September, and a valuable fortnight was taken up in finding what had already been done in the schools and what material was within reach. Programmes were drawn up, meetings of teachers held and the topics and purposes of the work explained. The main purposes kept in view were : (1) Interest of the pupils in their surroundings ; (2) Training in self dependence ; (3) Knowledge.

(1) It was felt that, without interest, the very life and soul of the work would be lost ; so, all first efforts were directed towards this end. If the pupils were interested, observation would naturally follow. Few people realize how blind the majority of us are.

(2) Training in self-dependence was believed to be one of the greatest values of Nature Study. In other subjects, books may be used, the teacher may help ; but the very essence of Nature Study is that it is the pupil's own eyes and brain that do the work ; it is all first hand, so that this value has been considered almost more than any other.

(3) While fully realizing the value of the knowledge to be gained, it was deemed advisable not to accentuate this too much. The teachers were already inclined to lose sight of the other values and consider only this, which was so much more in line with the usual school work.

Keeping these purposes in view, each monthly programme was made as varied as possible. The more varied the subjects, the more chance of appealing to the individual pupils and of interesting the teachers. And, further, the design was to arouse the pupils' interest in their whole environment.

The following outline gives a few of the topics on the programmes, with the reason for their appearance and the suggested methods of taking them up.

(*a*) Flowers and Seeds. This was meant to give the pupils a speaking acquaintance with a few of our common fall flowers. Seeds which had special means of dispersion were collected, and during the winter were discussed with the classes, attention being directed to the clever ways in which mother plants distribute their seeds. Common fruits were also studied. This proved a delightful topic with the children, who doubtless will watch the plants during the coming summer with great interest.

(*b*) Animals. The study of animals was taken up by all grades up to the sixth, but from very different standpoints. In the junior grades, the object was to interest the pupils more fully in the habits and care of domestic animals ; in the senior grades, in the relation of the animal to its environment ; and the chief object was the preparation of the pupils for the fuller study of adaptation in spring. This work proved exceedingly interesting, and, among the older pupils, much individual observation work was done and many hypotheses advanced to answer questions suggested by themselves.

(*c*) The Moon. The great purpose of this topic was to show pupils that by thoughtful observation many interesting problems could be solved, and to stimulate them to find out about some of the wonders of creation which are so often taken as matters of course. The pupils were to make observations and drawings, and then by wise questions the teacher was to lead them to suggest causes for the apparent double motion of the moon and for its change in appearance. This topic proved both a brilliant success and a dismal failure. In a few cases it was simply astonishing how readily the pupils—without being told anything—came to a clear understanding of the motions and phases of the moon, but in others very little was accomplished. On the whole, while the chief object was not always attained, so much interest was aroused that no doubt the moon will be looked upon by the pupils very differently in the future.

(*d*) Evaporation and Condensation. An effort has been made to arouse wonder in the children's minds, so that they may desire to understand all they see. Thus when it snows, the wish to know why it snows, where snow comes from, how it got there, and many other queries would naturally arise. These studies were taken up in order that such questions should be answered. The results were fairly satisfactory, though in a few cases the desire of the teacher to tell, worked somewhat against complete success.

(*e*) Stars. The senior grades were helped to find a few of the prominent constellations and to recognize some of the brighter stars. This proved most successful. The purpose was to arouse interest and the pupils, on the whole, were delighted with the work. It was almost amusing, too, to notice how the teachers seized upon this topic as something they could do. something tangible, something requiring explanation ; and, with this, the poorest Nature Study subject we have taken up, they felt quite at home.

From the above an idea of what we are attempting may be gathered. During the coming months we hope to do a great deal of most interesting work. Birds, flowers, insects, the weather. and much else will receive attention. Special work will be : seed germination and experiments on the growth of plants ; insect study, such as of the ant, with experiments suggested by the pupils; a flower-growing competition, and, not least, aquaria-keeping, with particular study of such creatures as mosquitoes, dragonflies, toads, and almost anything which the class may propose.

Having now touched upon what has been done in our schools, it may be well to mention some of the difficulties that had to be faced.

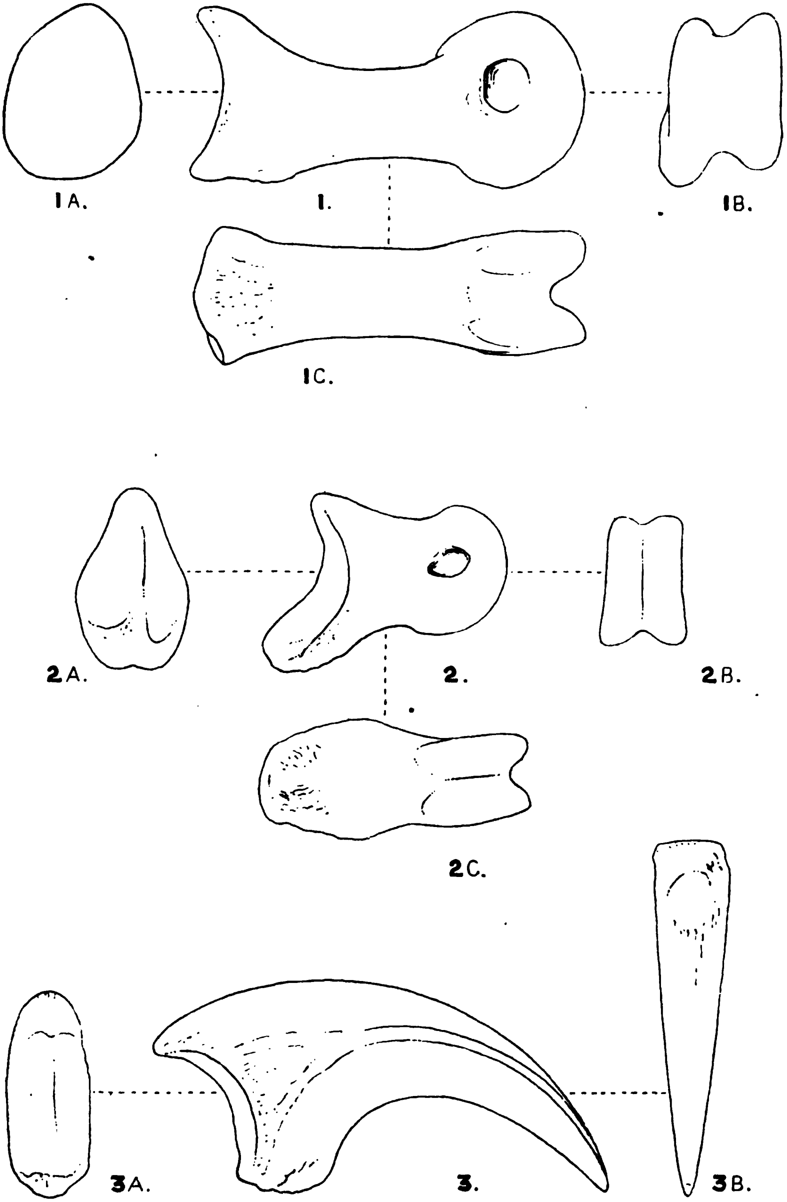
First came the question of time. The curriculum seemed already crowded. Other work showed results which could be seen; Nature Study was so entirely a matter of attitude that naturally there was a strong temptation to let it, if anything, be left undone.

Then, in the teachers themselves some difficulties arose. It was hard for them to forget the habits of years and cease to regard knowledge as the chief object of education. They wished to give information and when directed not to tell too much, in some cases went to the opposite extreme and did not even guide, but turned their classes adrift. Their lack of knowledge troubled them, and in a few instances topics were shunned for fear the pupils might ask questions which they could not answer. In spite of these difficulties, however, the teachers have done remarkably well; and I must express my admiration of the Winnipeg teachers as a body, for having taken up so well, work which was completely foreign to all their traditions.

Another difficulty arose with the pupils, in a few cases. They thought they knew all about the topics suggested. "Fancy studying a cat!" They had had one in the house for years. A very little trouble showed them how much they really knew.

Another difficulty was the "parent who didn't believe in such nonsense as studying a butterfly's wing." We heard of a few parents who objected to the work and at the same time showed a consummate ignorance of all about it. However, I am glad to say we received from the parents more encouragement than the reverse.

Last of all arises the question: "What results have been attained?" It is too soon to answer such a question when it is remembered that the work has for its end, not the mere acquisition of knowledge, but the development of interest and mental power; still, I think that results can be seen, for I have asked many times: "Do you see any results?" and have received such answers as: "They see much more;" "They see things they would never have seen before and are always asking questions about something." Surely interest and faculty for observation are things worth working for, and, to those who ask for knowledge as a result, many things can be pointed out as having added to the pupils' stock of facts. We have four months more to work in. If at the end of that time we can feel that the pupils as a whole are a little more interested, sympathetic, observant and self-reliant; and if they realize better that in all things, great or small, animate or inanimate, there is something wonderful, something worthy of study, then indeed our work has not been in vain.



To illustrate Mr. Lambe's Paper.

UNIV

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NESTING OF SOME CANADIAN WARBLERS.

By WM. L. KELLS, (Third paper.)

THE MOURNING WARBLER.

(*Geothlypis philadelphia.*)

The mourning warbler though not abundant in any district, is yet pretty widely distributed over the province of Ontario, as well as other divisions of eastern Canada, but it is among the last of the family to announce its vernal advent amid the wild scenery of its summer haunts. Usually, when the expanding buds of the lower underwood are bursting into leaves; when the yellow bloom of the leatherwood scents the spring-time air, and the virgin soil of the forests being variegated by the early wild flowers of the season ; the observer of bird migrations, if in the vicinity of its chosen summer home, will be enabled by the sound of its song, to add to his list, this species as among the more recent arrivals from the sunny south ; but as the month of July advances, its nesting period is over ; its notes for the season are silent; and the bird itself appears to be among the first of the members of its family to take its departure from the uncultivated scenery of its summer home ; and begin its aerial voyage towards its tropical winter residence in the regions of Central America. Here it enjoys the pleasure of existence amid perpetual summer, during that portion of the year when its Canadian father-land feels the chilly breath of the ice king, is covered with a mantle of snow, and swept by the wild storms of winter. In March it begins its northward journey, but two months pass away before it reaches the terminus of its winged voyage in the regions of its northern range, and summer home, and here begins again one of the chief objects of its migration movements *i. e.* the propagation of its species, and when the period in which this can only be done is over the impulses to return towards the south seem strong, and to yield to the impulses of nature in this matter is not long delayed; for by the middle of September, if not earlier, all this species—and its genus have disappeared; though some individuals may linger longer amid the scenery of their summer haunts in the thicket and the swamp, than is now known.

The haunts and home of the mourning warbler, during the period of its residence in Canada, are generally on the margins of low-land woods, or second-growth swamps, where there is an intermingling of young underwood, fallen brush, and raspberry vines. It may also occasionally be found to frequent wooded ravines, the sides of brush-covered hills, and the margins of muddy creeks which meander their courses through what are called "beaver-meadows," where there is deep concealment; and here, amid the deep foliage, one strain of the song-notes of the male of this species, may often be heard, in the mid-summer days, while the little performer itself is invisible. At times he will rise to a considerable elevation, and after a pleasing performance of quite a different series of musical notes, in the ventilation of which he appears to take much pleasure and pride, and during which he makes a rain-bow like circuit, and takes a rapid descent into the thicket below, near where it is probable the female has a nesting place. Another particular haunt of this bird is small clearings in tracts of hard-wood forest, and along the sides of road-ways, through primitive woods: but it is seldom observed out in the open fields, except in the backwood settlements, nor does it often approach the garden or other environments of human habitations, and except where the woods are open, it will not be found deep in the forest, but as the original forests of Southern Ontario are fast disappearing, time will no doubt effect great changes in the summer haunts of this species. In eastern Canada the mourning warbler does not appear to advance further north than the Gulf of St. Lawrence, and the valley of the Ottawa river; but in the western portion of its range—which extends to the foot-hills of the Rocky Mountains—it appears to extend its summer range to more northern latitudes, and higher altitudes than in the east.

Too little is yet known of the nesting history of this warbler to enable the investigator to decide whether it deposits more than one set of eggs in the breeding season: certainly its nesting period in Canada would not allow of it raising more than one brood during its stay in this country, but where the first clutch of eggs is taken, it will doubtless nest a second time. But, considering the many enemies among the smaller mammals, birds of prey, and reptiles, to which its eggs and young are exposed, it is doubtful if even one brood is raised by the majority of the pairs that cross our national boundary with each return of spring; even in the most protected localities; though the progress of civilization is rather in favor of its increase, except from the presence of the domestic cat; and yet it is wonderful how some nests of our garden—frequenting birds will escape the attention of this feline foe. The chief protective means resorted to by this species is by selecting a deep shady spot, either among the thick herbage, vines or young underwood, on, or near the ground; and then, after incubation has begun, and when the female becomes aware of danger, she does not fly directly from the nest, but quietly runs off among the surrounding shade, and does not take wing till some distance away, nor does she return to her charge till she thinks the danger is over. These efforts to protect her progeny, are, so far as human kind are concerned, so successful that very few of its nests are ever discovered; and its eggs are, and are ever likely to remain, a rarity in oological collections, but the case is very different with the lower orders of carnivorous mammals and snakes which are ever on the search to find and devour the eggs and young of every species that comes within their reach. In this charge the red squirrel, the chipmunk, the weasel, the mink, the skunk, and the fox, are among the chief transgressors that range the haunts of the warblers, while, nearer human habitations, cats, rats, and even mice, do their deadly work; and no enemy of all the warbler family is more to be dreaded than the vagabond cow-bird.

During the past twenty years a number of the nests of the mourning warbler have come under my observations, and the finding of these has been rather accidental than the results of continuous field and forest research; but the last of these noted up to the end of the season of 1902, is the first to which attention will here be directed. On the 8th of June, 1902, when strolling across a piece of recently cleared fallow, now over-grown with raspberry vines, on the northwest corner of *Wildwood Farm*, a small bird flushed out from a thicket of vines within a few feet of where I was passing. A little research revealed a new-made nest, which I inferred belonged to a mourning warbler; though at the time I had got only a glimpse of the builder; yet, though all the members of this genus of the warbler family compose nests, and deposit eggs much alike, there is always some variation on the part of each species, by which the attentive student of bird architecture can distinguish the owner, even in most cases without seeing the bird, much less without resorting to the crime of murdering the mother, and in this section of country I know of no other member of the family except the Maryland yellow-throat that nests in a similar manner and situation; and even between these near relatives there is a distinguishing difference which will be noted hereafter. This nest was not sunk in the soil, nor yet in the herbage in which the builder evidently desired to conceal it; but its foundation rested on some dry vine stalks elevated a few inches above the ground; and the first strata was formed of dry leaves and vine stalks placed loosely over each other, and not pressed down in the centre, as is the manner of the *Marylander*. On the top of this mass of dead leaves and stalks, and partly supported by the growing vines, the nest proper was placed. This was quite compactly put together, as though the materials were damp with rain, or the morning dew; when used by the builder, and may have been further moistened by the saliva of the bird when engaged in placing the particles together. The materials used were mostly dry leaves, fine fibres of vine stalks, rootlets, and some cattle hair. The inside was about two inches in diameter, by one and a half deep, the top of the nest was quite open, their being no artificial attempt at concealment, as is the habit of the Maryland yellow-throat. Six days after, I revisited this nest, the mother bird was at home and on flushing she did not rise on the wing, but ran off among the herbage in a mouse-like manner, for about 20 feet, when she rose and took a position on the top of a log, about two feet off the ground, and here she remained about a minute, twitching her wings and tail, a peculiarity of this species when excited. She flew off and disappeared in some underwood; but on neither occasion did she utter a note that I could hear, but there was no doubt of her identity as a female mourning warbler, for parting the canes and viewing the nest I found it contained four beautiful fresh eggs; but I inferred that the set was complete and incubation begun. The general color of these eggs was white, with a rosy blush, but less dotted with reddish brown spots than have been other sets of the eggs of this species previously observed.

Since the early years of our family settlement in the township of Peel, I had been acquainted with the appearance of this species, and acquired some knowledge of its life-habits, for it was almost the only member of its family that made its summer home amid the thick brush-wood, and partly cleared spaces along the banks of the little meandering stream that intersected the homestead farm where I passed my boyhood years, and in those early days of our pioneer life in the Canadian back-woods, it was known to me as "the linnet" for some of the elder members of our family stated that it resembled a little bird called by that name in our native land, and during those early times I often saw its nesting places, but of these I have know only dim recollections. During my nine years residence in North Wallace I failed to identify this species among the avifauna of that section; though I noted several other members of this family that to me were previously unknown. After coming to Listowel in the spring of 1874, and devoting more time and attention to the life-histories of our birds, I soon again recognized my old friend of by-gone years, but for a time I confounded it with another species. In this vicinity I found the mourning warbler to be a tolerably common summer resident, but its presence is usually confined to the margins of certain lowland woods; and one June-time day when investigating the avifaunian life of a certain tract of forest, to the southwards of the town, our dog flushed a female ot this species, which from her notes and excited actions, I inferred had a nest near by; but which at the time I failed to find. Returning some hours afterwards the bird was again flushed, and after a little search, the nest containing five eggs, was found. This was placed in the butt end of a cedar tree that had been uprooted, but from which the earth had fallen away, the site being about eighteen inches above the ground; this nest was a bulky affair, and loosely put together; being composed of dry leaves, weed stems, vines, rootlets and lined with hair. This was the first nest of this bird that I discovered of whose identity I was certain. Since then a number of the nests of this species has come under my observations, but nearly all of these were placed among growing vines, and mostly raised off the ground, like the one first described. One however, was placed in a clump of sedge grass, growing in low ground that earlier in the season had been covered with water.

In the "Biological Review of Ontario," published by the Canadian Institute in Toronto, 1891, is an article from me on a nest of the mourning warbler taken that season, which I here reproduce.

"On the 28th of May, as I was doing some work on the margin of a swampy burn, and the highland wood on our farm, I discovered in a clump of yellow-topped weeds a newly made nest, of whose ownership I was at first uncertain, as it seemed to be rather large for any of the warblers that nested in such situations. On the 3rd of June this nest contained four eggs, and as the day had passed without one being deposited, I concluded that the set was complete, so I took them, and they are now in my collection. On this occasion the mother bird was seated on the nest which she did not leave until I almost touched her with my hand, and then, instead of flying out, she ran mouse-like into a neighboring brush-pile, which I shook before she flushed to a stand a few yards off, when she uttered some notes and I had no doubt of her identity as a female mourning warbler. The ground color of these eggs is white, and the spotting more of a brownish hue, than either reddish, or black, and one of the set has its marking on the smaller end. The nest itself was rather bulky for the size of the bird. Underneath on the earth was a platform of dry weed stalks; then dry leaves, which had evidently been put together in a moist condition, formed the bottom and the sides of the nest; but the upper rim, and the inside was formed of fibers of vines and grasses, and there was some cattle-tail hair intermingled with the lining."

In 1871, Dr. A. M. Ross of Toronto, published a little work on "The Birds of Canada," which is remarkable as being the first treatise on this subject composed by a resident of Ontario. The following is what he wrote on the mourning warbler. "Its note is a little 'chit,' uttered in a soft, pensive tone; general color, ashy gray above, and black underneath. Breeds in Canada, nest in a low bush; eggs four, blush white."

In length, this species is between five and six inches. The plumage varies somewhat according to age, and season; but is generally on the upper parts of the body of a bright olive hue, with ashy on the head, below clear yellow, the throat and breast being black, the plumage of both sex is similar.

Listowel, Ontario, Canada.

ORNITHOLOGY.

A WHITE PELICAN AT MANOTICK.

J. F. WHITEAVES.

The Museum of the Geological Survey has recently acquired a fine specimen of the American white pelican, *Pelecanus erythrorhynchus*, which was shot two miles south of Manotick, Ont., by Mr. John Flann, Jr., on the 25th of May last. When shot, it was on a log in the Rideau River. It is a fine adult female in full spring plumage, with the culmen or ridge of the upper mandible of its bill flattened, and entirely devoid of the high, thin, upright comb or crest that is so characteristic of the middle of that part of the bill of the male of this species during the breeding season. The bill was partly pale horn and partly pale flesh coloured, with an orange tip to the upper mandible and a yellow patch round each eye; the pouch was bright yellow, the iris of each eye hazel or dark brown (not white), and the legs and feet bright orange. On dissection, the flesh was found to be inflated everywhere by numerous large air cells, most of the eggs were no larger than a small shot, though a few were as large as peas, and the stomach contained six freshly caught yellow perch about three or four inches in length.

The American white pelican, which was first described by Gmelin in 1788, is an abundant summer resident in the prairie country of Manitoba and the North West Territories, where it breeds in colonies, but it is rare in British Columbia. In winter it is common in Florida, and its course of migration northward is said to be along the great inland rivers, for in summer it is essentially an inland dweller. Macoun says that stragglers of this species are occasionally taken on Lake Ontario and others on Lake Erie, and Chamberlain that "one specimen has been taken in Nova Scotia and two in New Brunswick." But, so far as the writer is aware, this is the first record of its occurence in the Ottawa valley. It was previously represented in the Survey collection by one specimen from Lake Winnipeg, shot by Mr. J. M. Macoun in 1884 and another from Crane Lake, Assa., shot by Mr. Sreadborough in 1896; by a series of its eggs, from a small island at the western end of Lake Winnipegosis, collected by Mr. J. B. Tyrrell in 1889; and by a large photograph of the nesting place of a colony, at Shoal Lake, Manitoba.

Two other species or varieties of pelican are of much rarer occurrence in Canada, and both of these are of an essentially marine habit.

One of these is the brown pelican, *Pelecanus fuscus*, which was first described by Linnæus in 1766, and which is common in the Southern Atlantic and Gulf States. During the last ten years at least three specimens of it have been shot in Nova Scotia, and one of these is in the Museum of the Survey.

The other is the Californian brown pelican, *Pelecanus Californicus*, two specimens of which, according to Mr. Fannin, have been shot on the coast of British Columbia. It was first described by Ridgway in 1884, and may be only a local variety of *Pelecanus fuscus*.

The "Pelican of the Wilderness," (Kâath) of the Psalms, is the European white pelican, *Pelecanus onocrotalus*, the male of which has no crest to the upper mandible in the breeding season. This species spends the winter in Palestine and migrates to Russia in the summer. Under the Mosaic dispensation, the use of its flesh for food was forbidden to the Jews. A recent writer says of it that the operation of feeding its young is rendered easier by the parent pressing the pouch and lower mandible against the breast, and the contrast of the red hook of the bill with the white of the breast probably gave rise to the poetic idea of the ancients, that the female pelican nourished her young with her blood. From the earliest times the pelican has been the emblem of charity.

MY BIRDS AND HOW THEY CAME TO ME.

It was my good fortune to spend the coldest week of this winter in a small New Hampshire town on the bank of the Connecticut River. The thermometer stood at 25° at breakfast time; the days were sunny, the air was still, and the moon at the full; all this with an unbroken level of fresh snow made winter a delight to one "who likes that kind of thing."

Sparrows were not to be seen at our end of the town, but chickadees, white-breasted nuthatches, pine grosbeaks and downy and hairy woodpeckers were more or less common visitors. A sheltered corner of the verandah had been wired in below by way of protection from cats and in this corner was a large wooden trough filled with dried sun-flowers, while suet hung from the trees and shrubs near by. To the sun-flowers came flocks of chickadees, with an occasional nuthatch, in and out the live-long day. I watched them with delight and came home to try my hand at feeding birds in Cambridge.

On the south side of the house stands a willow-tree whose long boughs reach out in all directions, making in summer a forest of green, where birds of various kinds find camping ground. There have been crows, robins, grackles, rose-breasted grosbeaks, pine grosbeaks, white-breasted nuthatches, chickadees, brown creepers, flickers, downy woodpeckers, humming birds, song sparrows, chipping sparrows, redstarts, cedar birds, vireos, summer yellowbirds, orioles, blue jays, golden-crowned kinglets, goldfinches, cuckoos, and once—A day to be remembered!—one of the maids came breathless to my door.

"Please, Miss, John wants you to look out of the window to see a bird."

"What is it, John?" I said.

"Well, it was the reddest bird I ever seen. I was watering the purple beech and he came and bathed in the pool; but now he's gone."

"Don't you think it was a robin?" I asked in exact imitation of my own Bird-man, who generally calls all my new birds English sparrows.

"Robin?" repeated John, "Well, no, it wasn't a robin. As if

I didn't know a robin!" muttered the exasperated observer; and sure enough, as I stood at the window, still thinking, "it was just a robin," suddenly there lighted on the willow bough almost within touch, "the reddest bird *I* ever seen."

"Do I look like a robin?" he asked.

"No, not in the least," I answered. "You beautiful scarlet tanager!"

All these birds have at various times perched on the willow-tree, but until this year I had never thought to feed as well as shelter the winter guests.

The first venture was in suet; cutting pieces as large as my fist and tying them to a long string I threw them from my bedroom window over the nearest willow bough fastening the string to the window-sill so that the suet was quite under control. At the end of a week the chickadees were literally in full swing.

I next bought a peck of sun-flower seeds and scattering them on a drawing-board I put the board on the window-ledge shutting down the sash to steady the board. In three days the chickadees were on the board. I then bought a plaster-cast of a hand and arm, filled the hand with seeds and put it on the window-ledge. The birds came to the hand. Finally I put out my own hand with seeds and in two minutes a chickadee was on my hand. No one who has not tried it can know the pleasure of feeling the little feet of a wild bird clinging to one's finger. Since then the chickadees have come to me every day, even flying about the room,—this, however, is accidental and not always agreeable to them; one however made himself quite at home, flew from one spot to another without dismay, and at last perched on the top of the door, and when I reached up my hand he hopped upon my finger and let me carry him to the window. A basket full of sun-flower seeds and chopped raw peanuts stands on the window-ledge and to this come the nuthatches as well as the chickadees; but they are not so tame and although one comes to me and flutters over my hand, its courage fails it at the last and it darts back to the willow bough and cries "yank, yank," until I draw back my hand, and then it flies to the basket and looks up in my face quite at its ease. A woodpecker has been at the basket; the kinglets poise under the suet, and once I saw a goldfinch hanging on it.

In February we had a small flock of pine grosbeaks feeding on the privet berries and on rotten apples thrown on the ground, a flicker also came every day for the apples. In trying to hang an apple on the willow bough for the grosbeak I miscalculated the length of the string, the apple fell short, rebounded and broke the dining-room window. The glass was mended, I tried again, and an apple hung oddly enough from a winter-bare willow bough, and I sat me down to wait for a grosbeak. In a few minutes a great gray squirrel ran up the tree and in clawing the apple he tipped it over the bough and it hit the window again: this time, however, without any castastrophe. Probably a squirrel cannot throw as hard as a woman. After that the apples lay on the ground, or rather on the snow, for until quite lately there has been no "ground" to be seen.

Now that the snow has almost gone and the birds are finding food elsewhere, they come less often to my window, but the pleasure of having had them will be a joy forever.

M. E.

Cambridge, Massachusetts,
March 22, 1904.

SUB-EXCURSION TO BLUEBERRY POINT.

The Ottawa Field Naturalists' Club held its second sub-excursion for 1904 to Blueberry Point, Aylmer, on May 7th. About 150 persons were present, the Normal School and the Ottawa Ladies' College being well represented.

The Trailing Arbutus (*Epigaea repens*) was very abundant and eagerly collected. The banksian, red and white pines were observed and *Viola cardaminefolia* and *V. subviscosa*, collected in good condition.

At the close of the afternoon's work Dr. Sinclair assembled the party and called for addresses from the leaders present. Mr. W. J. Wilson illustrated by means of a map the geographical formation of the district, and gave some valuable hints to those commencing field work in geology. He pointed out that the unusually high water of the Ottawa River had covered all the shore material and prevented his section from doing any work in the usual locality. Messrs. Gibson and Young reported the season a backward one, as they had taken very few species of insects. Two species of butterflies, the Spring Blue and the Early Native White were observed for the first time this year.

Rev. Dr. Blackader and Mr. Clarke spoke of the plants found. Dr. Macdonald, M.A., drew attention to the benefits to be derived from an outing with the Field Naturalists' Club, and expressed his appreciation of their work.

BOTANICAL NOTES.

ALUM ROOT AS A REMEDY FOR DIARRHŒA.

An interesting note on the medicinal value of Alum-root, (*Heuchera hispida*, Pursh) has been sent in by Mr. W. McCarthy of Rat Portage, Ont., who writes : "I was out prospecting with two white men (Mr. Moore and Mr. Walters) and an Indian. The two former were taken sick with severe diarrhœa for three days. The Indian left camp and went to the bush and got some of the plant I send you. He gave each of the men about an inch of the root to chew and swallow the juice. It acted like magic and the next day they were quite recovered. I have since had some of the root pounded fine and put a little water on it and boiled it up with sugar. I then strained it and have given it to several infants for cholera infantum and it has proved successful. The plant is abundant here and I have given it to several who have also used it successfully." The closely allied *Heuchera Americana*, *L.*, is known to be a powerful astringent.

J. FLETCHER.

NATURE STUDY—NO. XIV.

SOME UNDERLYING PRINCIPLES, METHOD AND SYSTEM OF NATURE STUDY.

C. W. G. EIFRIG.

Most educators, and people of alert mind generally, have come to recognize the usefulness and even necessity of Nature Study for people in general and the young in particular. I hold that to study and know something about nature and the objects in it, among which we live, which we see, hear and are brought in more or less close proximity to, is as useful and profitable for a person as some of the branches of science and art hitherto taught in schools and colleges to the exclusion of everything else. For instance, if we learn at school, where a certain city or river is situated in the world, which we shall perhaps never see or even hear of again, it is just as valuable to know where certain trees and plants grow, especially in our neighborhood, and why, and where the different individuals or families of living things stay and where they do not as well as for what purpose. If we read in history of the irruptions of, say, the Huns into Europe and their defeat A.D. 453, or of the imigration of the Anglo-Saxons into Britain 449 A.D., etc., it is just as important and valuable for people to know about the irruption and migration, the appearance and disappearance of insects, birds, mammals, fishes, plants, etc., which may affect our lives favorably or unfavorably, destroy our crops or trees, or help us to overcome such pests, etc. If we derive endless pleasure by studying the gems of thought and diction in literature, why overlook the gems of God's own handiwork in His mineral, vegetable and animal kingdoms surrounding us! And these can be found and enjoyed not from dusty books, but out in the sweet-scented air and healthgiving sunshine. If a person not used to it, once tries to see and observe things in nature, he will soon find how little he is able to see and hear and differentiate correctly, how little he can use his senses properly, showing that while his head may be crammed full of book knowledge, his faculties to rightly observe things near him have been neglected, and he will perceive, that, though he knows a good deal about things far removed from him by space or time, he knows little or nothing of things surrounding him, of which he perhaps makes daily use or could do so, and from which he might be able to derive enjoyment if he were able to understand, know or at least properly observe them. So, there can be no difference of opinion as to the usefulness and necessity of Nature Study. But, regarding the ways and means of it, there is as yet no concurrence of opinion. And it is the object of this paper to state some underlying principles for Nature Study as the writer conceives it, whether it is carried on professionally or in an amatuer-like manner, and whether much or little time can be devoted to it.

In the first place, Nature Study must not be looked upon and taken up as a *fad*. Ours is eminently an age of fads. Faddism is carried into every branch of human activity. If one takes up Nature Study, or any other study, as a fad, as a passing whim of fashion, as an affectation of some people, he or she thereby debases such study, debauches the mind and intellect, and squanders time and money No, it must be looked upon as a study requiring earnestness of purpose, all powers of mind and body while carried on, devotion and application to it, also patience and resourcefulness. Whoever does not want to undertake Nature Study in this way, had better not begin it at all, or at least not call his weak dabbling with science and nature or his more or less purposeless rambles, Nature Study.

As is necessary in most undertakings of men, a student of nature must not begin his work at random, in a purposeless and ever-shifting way, but there must be method and system in his work, be this much or little. To attempt to carry on Nature Study without this would be as foolish as trying to build a house without plan or fixed idea. As a few most necessary principles underlying the system and method of the study of nature, I would submit these, viz.: *Limitation*, *concentration*, *exactness*, and after all this, the making *accessible* to others of the results.

So, first, there is *limitation*, *i. e.* that a student of nature, professional or otherwise, confines himself to certain limited areas of investigation of objects offered us by nature. Life is too short, even for one who can give *all* his time to this, to take up all the fascinating problems that ask for solution in the realm of nature. So, if a lover of this study would plunge himself into it headlong, try to begin everything, and follow all lines of investigation, he would soon be hopelessly stranded and become disgusted at the impossibility of his undertaking. One should rather take up a small area, the smaller the less his time is, and he may obtain gratifying results. If you cannot take up botany entire, or dendrology, or herpetology or ichtyology, etc., take up a small item in one or more of these, *e. g.* the study of mosses or lichens or mushrooms, or begin with a family of trees or birds or fishes or insects. There are few, even among the most common insects or birds or mammals, whose life history is entirely and completely known.

Furthermore there is *concentration*, in which must be included thoroughness and patience. One must concentrate his mind on the chosen study, and give it his best efforts. He must not be superficial but thorough in his observations. He must not jump at conclusions. That is extremely dangerous. Science does not want it, although many scientific men indulge in it. Science is derived from the Latin *scio*, to know; it must deal with *facts* only. So, painstaking, laborious investigation and observation is wanted, not half-observed phenomena and guesses. Sometimes an infinite amount of patience is required. Think of John Burroughs digging away two or three tons of earth in order to understand the ways of a weasel's underground home! Or Audubon, now in the far west, now in Labrador, now in the limitless forests of Kentucky or the impenetrable mangrove thickets of the gulf coast, in heat and cold, observing, sketching, recording. If a bird or insect with which one wishes to become acquainted flies into a thicket or swamp, it will not do to remain outside; it means to follow it up at the risk of ruffling one's clothes and temper.

Coupled with thoroughness must be *exactness*. A student may be thorough, not spare himself labor and exertion, and yet not be exact in gettting at his results or recording them. If he sees a certain damage done to a plant by insects, and finds an insect on the plant, it would not do to assume that this is the author of the harm until he sees it at work. The same holds good in all other branches. One must have a sense of responsibility, feeling that by inexactness he may cause people to believe and circulate untruth, which would always be harmful, leaving aside the moral issue.

And last but not least, a conscientious, patient, systematic student of nature should consider it his duty *to make the results of his labors accessible* to others, to science in general. If a person has found out one fact concerning any mineral, plant or animal, large or small, a fact not known before or disputed, and is certain of it, he contributes to the sum of human knowledge by having it printed in some suitable medium of communication between scientific men, or where they can find it. At least let him give his notes to some such person who is able to apply the fruit of his labors to wider usefulness.

Now, after reading this, some ardent lover of nature who thought of becoming an amateur student of it, may say to himself, well, this rules me out of Nature Study; I have neither the time, nor the money, nor the scientific attainments of the mind to carry it on in this wise. But hold on! The underlying principles here mentioned, namely limitation, concentration, exactness and the making the results of your observations accessible to others, does not necessarily require all one's time, or much money and great scientific knowledge. There are people who have contributed largely to the sum of human knowledge who were busy men and did not have much leisure time and remained in their occupation throughout their life, one, a fellow of the Linnaean Society, London, remaining a cobbler to the end of his days. Nor must you think that only startling discoveries are valuable to man. No, many little, but correct observations round out the sum total of human knowledge just as surely and effectually. And how many great discoveries etc., have been begun in a small way! Look at James Watt, pondering over the phenomenon of the escaping steam from the tea-kettle lifting up the lid. By following this up, he became the inventor of the steam engine. The lawn in front of your house may harbor an insect new to science. Novices in astronomy have discovered new stars. Tenacity of will-power counts for most here, whether one has little or much time. And even if you can not achieve any results satisfactory to yourself, you will at least get into closer touch with nature, your powers of the senses will be whetted, you will see and hear more beautiful things than people who have no eye or ear for them, though they live right amongst them. It is a thing of beauty and a joy forever to observe the ways of living things in field, woods and meadow; to see the wise adaptation of means to certain ends and to behold the beauty of design and finish in even the minutest specimens of God's handiwork in nature. And then, there is the healthfulness of it! Pure air and sunshine are by far the best preventive and curative medicines in the world. And while taking them in, it is better to have some object in view, to engage the mind somewhat, else it will soon become tedious. And that something ought then to be one of the fields of Nature Study, even though a much restricted one must be chosen.

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ON THE SQUAMOSO PARIETAL CREST OF TWO SPECIES OF HORNED DINOSAURS FROM THE CRETACEOUS OF ALBERTA.

By LAWRENCE M. LAMBE, F.G.S., F.R.S.C., (With two plates.)

One of the most interesting features of the fauna of the Belly River series of the Cretaceous of the West is the presence of Ceratopsids more primitive than those of the Laramie. Of the former the writer, in the second part of volume III (quarto) of Contributions to Canadian Palæontology, 1892, described three species of *Monoclonius*, viz. *M. dawsoni*, *M. canadensis* and *M. belli*, all from the Red Deer river district. In a further study of the type material on which *M. dawsoni* was founded, it became apparent that two species had been included under one name and also that the species distinct from *M. dawsoni* probably represents a new generic form. The material denoting the new genus and species, and originally referred to *M. dawsoni*, consists of a large posterior crest (p. 59, fig. 15, op. cit), with which was found a nasal horn core. This crest is unique in having hooked-processes developed on the posterior border.

For the form represented by the crest with hooked-processes the generic term *Centrosaurus* is proposed and the name *apertus*, in reference to the large fontanelles, is deemed an appropriate one for the species.

In a paper by the writer, to be published shortly, a detailed description with figures will be given of the posterior crest of *Centrosaurus apertus* as well as of that of *Monoclonius canadensis*. The skull, described in the above mentioned memoir, p. 57, fig. 14, cat. No. 1173, is retained as the type of *Monoclonius dawsoni*.

The fontanelles of the crest of *Centrosaurus apertus* are included entirely within the parietal part of the expansion, those of *Monoclonius canadensis* are bounded on the outer side by both the parietal and the squamosal.

The crest of *C. apertus* is composed principally of the coalesced parietals which form an expansion having somewhat the shape of a saddle, broader than long and much more robust posteriorly than in front where the bone is decidedly thin. The squamosal is not known. The parietal part of the expansion, figures 1 and 2, plate I, is longitudinally ridged in the median line, is broadly expanded laterally on either side, and ends posteriorly in a robust transverse bar that is concave in outline behind as viewed from above. The fontanelles occur one on either side of the median line and are of large size: they are bounded behind by the transverse bar that forms the posterior border of the crest, and laterally and in front by the thin side extensions. Along the median line the bone is transversely concave beneath. The separate ossifications, named by Marsh epoccipitals, are well developed in four pairs, with in addition the pair of hooked-processes, already mentioned, which are regarded as specially developed epoccipitals. The alar extensions are referred to in the original description as the squamosal portion of the crest, the squamosals being then regarded as having coalesced with the parietals. Near the anterior border of the right extension, however, there is a definite line of demarcation, *a*, figures 1 and 2, which can be considered only as the suture for the squamosal. The writer's attention was drawn to this suture, and to the wrong interpretation in the original description of the nature of the side extensions, by Mr. J. B. Hatcher, Curator of the Department of Vertebrate Palæontology of the Carnegie Museum, Pittsburgh, who, with his intimate knowledge of the *Ceratopsidæ*, is justly regarded as one of the foremost authorities on this interesting family. The postfrontal suture, *b*, figures 1 and 2, extends from the inner side of the anterior end of the fontanelle obliquely forward and inward to the median line in front. Numerous impressions of blood-vessels are present on and in the neighbourhood of the epoccipitals and hooked-processes, and on the upper surface along the median ridge. The thickness of the bone at a number of points, is indicated in centimetres by the numerals in figure 1.

The horn core, figure 3, found with the crest is presumably a nasal one. It is straight, and laterally compressed so as to be lenticular in cross section presenting a sharp edge to the front and rear. A somewhat similarly shaped nasal horn core has been described by Cope under the name *Monoclonius sphenocerus*. One side, that figured, is deeply channelled longitudinally, the other is more regularly convex ; vascular markings are conspicuous on both sides. There is apparently no great distortion, if any, of the specimen, which is 30 centimetres long and imperfect at the tip and below.

We may conclude from the above that *Centrosaurus apertus* had a broadly expanded squamoso-parietal crest composed mainly of the coalesced parietals, the squamosals being confined to the antero-lateral edge of, and taking but little part in the formation of, the frill. That the large oval fontanelles were included entirely within the parietal part of the expansion and that epoccipital bones were well developed, of which the hinder pair were greatly modified so as to form large hooks or spurs of bone on the hinder border. That a closely fitting integument was present, as is indicated by the many impressions of blood-vessels on the upper surface, with the probability that the projections of the periphery at the sides and behind were sheathed in horn.

The squamoso-parietal frill of *Monoclonius canadensis* is represented by a well preserved right squamosal, figures 4 and 6, and part of the parietal, figures 5 and 7. With these were found other parts of the skull, to which reference has been made in the original description.

The squamosal is plate-like, somewhat triangular in shape, with the apex of the triangle directed backward. The inner border is concave in outline, the outer one convex and scalloped. The front border has two deep emarginations in its outer half ; in the inner half are the sutures for the jugal and postfrontal. Its upper surface is smooth. Beneath is a deep pit, *c*, figure 6, which received a process from the quadrate, and at a slightly lower level the outer end of the exoccipital probably effected a junction where the broken surface is indicated at *d*. A shallow groove, *f*, figures 6 and 4, extends from the raised surface for the exoccipital to and over the inner border to the upper surface where it ends; it becomes deeper and narrower near the border. There is a wide triangular excavation in the inner front portion of the lower surface with indications that the bone here overlapped the postfrontal to some extent, the contact with the jugal being limited to a small surface which would include the marginal pit shewn in figure 4 at *e*.

The parietal reached the squamosal from behind by means of an attenuated lateral extension of which only the anterior extremity is known. This part of the parietal is keeled below, figure 7, and is triangular in cross section, with a flat upper surface, figure 5, that fits into a shallow groove along the inner posterior border of the lower surface of the squamosal as shewn by the dotted lines in figures 4 and 6. Its free outer border behind continues the sinuous curves of the outer border of the squamosal. The parietal portion of the crest of this species may have had some resemblance to the coalesced parietal bone, the only known part of the crest, of *Monoclonius belli.*

On the inner side of the squamosal and the forwardly directed posterior extension of the parietal was an opening in the crest of great size much larger probably than the parietal fontanelle of *Centrosaurus apertus.*

From the foregoing it is seen that the posterior crest of *Monoclonius canadensis* extended far back, that it was made up of the parietals (probably coalesced and bearing some resemblance in form to the corresponding portion of the frill of *M. belli*) and the squamosals, the latter entering largely into its composition, and that fontanelles of very large size were present. We find also that the fontanelles were not included entirely within the parietals, as in *Centrosaurus apertus* but were bounded laterally in front by the squamosals.

EXPLANATION OF PLATES.

PLATE I.

Figure 1—Coalesced parietals of *Centrosaurus apertus* viewed from above; one-eighth natural size.

Figure 2—The same, viewed from the right side and similarly reduced.

Figure 3—Lateral aspect of nasal horn core of *C. apertus*; one-eighth natural size.

PLATE II.

Figure 4—Right squamosal of *Monoclonius canadensis,* exterior view; one-sixth natural size.

Figure 5—Upper surface of front end of right lateral posterior extension of parietal of *M. canadensis;* similarly reduced.

Figure 6—Interior view of the squamosal shewn in figure 3; similarly reduced. The dotted line in this figure and in figure 4 indicates the position of the parietal extension when applied to the squamosal.

Figure 7—Lower surface of the bone shewn in figure 5; similarly reduced

THE MOUNTAIN BLUEBIRD IN MANITOBA.

By NORMAN CRIDDLE, of Aweme, Man.

In an interesting paper on "Rare Manitoba birds," read before the Historical and Scientific Society of Manitoba, on February 9th, 1904, by Mr. G. E. Atkinson and published in the Manitoba Free Press, mention is made of two Mountain Bluebirds (*Sialia arctica*) having been seen in October, 1896, near Brandon, one of which was shot. These are apparently the only records of the bird's appearance in Manitoba, excepting a few notes on their migration sent by me to the United States Biological Survey.

This bird is, however, by no means uncommon in the tract of country lying between this place and Carberry—known locally as the "Sand Hills" or "Spruce Bush"—and it seems probable that, when its favourite haunts are more generally known, it will be found in several of the more hilly parts of the province.

The "Sand Hills" mentioned above consist of low sandy hills, very often with blow-outs on their south sides and underbrush on the north. These hills, which seldom rise more than forty feet above their bases, usually contain on their tops and sides—when protected from fire—clumps of spruce, and between their ranges—that contain an occasional pond—grow aspen, willows and a few stunted oaks, etc.

These oaks which are often hollow, in company with a few old stumps that have been previously used by woodpeckers, make ideal nesting places for the bluebirds, and any person in search of them during the latter half of June, would probably find several nests in a day.

Of the numerous nests examined by me, some were more than nine feet from the ground, the average being just under four. They were built of dead grass and contained, when the birds had finished laying, six eggs, which closely resemble those of *S. sialis*, excepting that they are smaller.

The reason that these birds are not more generally known in Manitoba, seems to be their habit of seldom flying far from their breeding ground. As an instance, I have lived within five miles of their nesting places for over twenty years without seeing one here.

My migration notes are unsatisfactory. The earliest arrival was noted May 7th, 1900, the last noted being October 14th, 1899, and October 16th, 1900. These dates could probably be extended both ways, as they are taken after only a few hours spent in the "Sand Hills" with long intervals between each visit.

For the benefit of readers that are not acquainted with the different bluebirds of North America, the following distinguishing features of our Canadian species may prove of interest:

BLUFBIRD (*S. sialis*). Male: above azure blue; throat and breast rusty brown; belly whitish. Female: blue of back more grayish brown; breast less rusty. Male in winter much the same as female.

WESTERN BLUEBIRD (*S. mexicana occidentalis*). Male distinguished from *S. sialis* by having rusty brown on fore back and the throat blue. Female duller. The range of this species is given in Chapman's Colour Key, as "Pacific coast from Northern Lower California north to British Columbia," etc.

MOUNTAIN BLUEBIRD, (*S. arctica*). Male: above bright blue; throat and breast rather paler; belly whitish. Female: above bluish gray, with very slight brownish tint; rump blue; throat and breast bluish buff; belly white. The specimens observed closely by me seem to be distinctly bluer than the description in Chapman s Colour Key. This species is said to breed from "Sierra Nevada east to the plains, and from New Mexico north to the great Slave Lake region."

There is practically no difference in the length of these three birds.

NOTE ON THE FOOD VALUE OF CERTAIN MUSHROOMS

By FRANK T. SHUTT.

In the minds of most of us, no doubt, mushrooms are regarded rather as a delicacy than as an article of food. Their peculiarly agreeable and somewhat piquant flavour when properly prepared and carefully cooked has established for many species of edible fungi a world-wide reputation for the making of ragouts, sauces, and as "flavourers" generally; but, speaking broadly, most have failed to recognise their highly nutritious character. Their price in city markets is undoubtedly out of all proportion to their value as food, but we must conclude that the well-nigh general neglect to gather and use them in districts where they occur in abundance, is due chiefly to ignorance of their nature from the standpoint we are now considering them.*

Analysis shows them to be characterized by a comparatively speaking large percentage of nitrogenous matter (crude protein), a considerable proportion of which exists in the form of true protein or albuminoids. The function of this latter class of constituents of foods is to repair the daily waste of the body and build up its tissues, and hence the proteids are commonly known as flesh-formers, and are consequently to be regarded as the most important of the nutrients, whether in animal or vegetable foods.

Last autumn, in order to obtain data that might be of interest in this connection, a partial analysis was made of certain species that are found in abundance on the lawn of the Experimental Farm, Ottawa. These comprised the Fairy-ring Champignon (*Marasmius oreades*), the Grey Coprinus or true Inkcap (*Coprinus atramentarius*), and the Shaggy Coprinus or Horse tail Mushroom (*Coprinus comatus*), commonly known as "Umbrellas". The results are as follows :—

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*There are, we know, many persons who have a dread of all fungi, for fear of being poisoned, and it is only natural that they should hesitate to avail themselves of these nutritious delicacies.

	Collected Oct. 14th., 1903.	Dry Matter. per cent.	Crude Protein. per cent.
1.	*Marasmius oreades*, mature ...	10.15	4.07
2.	*Coprinus atramentarius*.	5.67	1.37
3.	" *comatus*, immature...	9.10	2.97
4.	" " mature....	6.77	2.71
5	" " old, but firm	6.14	1.36

In the case of the *Marasmius*, it was found that 70 per cent. of the crude protein was present as albuminoids. Of the crude protein in mature *C. comutus* (No. 4), 68 per cent. existed as albuminoids, a percentage that was reduced to 48 in the older specimens of the same species (No. 5). Unfortunately, by reason of insufficient material, the proportion of albuminoids in the crude protein of Nos. 2 and 3 could not be determined.

When it is pointed out that but few of our commonly used vegetables and salad plants contain more than 10 per cent. to 11 per cent. dry matter—and many of them, as vegetable marrow, celery, lettuce, cucumbers, &c., do not possess much more than half such an amount—it will be obvious that mushrooms are worthy to rank with these most useful articles of diet. But it is not merely in dry matter that the edible fungi make their claim to recognition as a food. This dry matter is highly nitrogenous. Our data on this point are very clear. Further, these analyses indicate that the greater part of this nitrogenous matter exists in the more valuable form of albuminoids. In this respect, mushrooms are without doubt much superior to vegetables and fruits.

If time permits, this work will be continued during the coming season. There are many other species of edible fungi in abundance, in addition to those mentioned in this note, and we hope, as opportunity offers, to ascertain their relative food values. We, further, wish to examine these mushrooms at various stages of growth, for the results from the *C. comatus* here given would indicate a falling off in nutritive value after reaching a certain degree of edible maturity, due to decreasing dry matter and albuminoids. This may only occur in the deliquescent fungi, but it will be interesting to have further data upon what must be considered a point of both scientific and economic importance.

Laboratory, Experimental Farm, Ottawa, May 1st, 1904.

GENERAL EXCURSIONS.

The Ottawa Field Naturalists' Club held the first general excursion to Casselman on May 21st. The president, Mr. W. T. Macoun, was in charge, and leaders in various branches of the Club's work were present, but the heavy rains of the preceding days limited the attendance to a few members of the Club.

The collecting field at Casselman is a most varied one, and the different sections soon separated for the day's work. Dr. Ami took a party along the bank of the Nation River, and they were successful in unearthing numerous relics of the South Nation Indians, an Algonquin tribe whose name is borne by this tributary of the Ottawa river.

Dr. Fletcher, Messrs. Gibson and Young led the entomological section and secured many specimens of insects, among them 10 different species of butterflies. *Thecla niphon* was, perhaps, the rarest of these. This is a small brown butterfly the caterpillar of which feeds on the young shoots of pine trees. A specimen of the rare beetle *Hylecœtus lugubris* was seen on the railway track and was caught but made its escape. Several specimens of *Sphœridium scarabœoides* were secured.

The ornithologists found that both locality and season combined to furnish ideal conditions. No less than forty-nine species of birds were observed by Rev. C. W. Eifrig. The Greater Yellow-legs and the Black-bellied Plover were both seen along the river. A Migrant Shrike's nest with five young and one egg was found. The nest was placed on one of the lower branches of a plum tree. A Bluebird's nest with 5 eggs and a nest of the Savanna Sparrow were also seen.

The botanical section found several species that are not of common occurence near Ottawa. Four species of *Trillium* were collected, the rarest being *Trillium cernuum*. *Trillium grandiflorum* with exceptionally large flowers was common. In some of these the white petals from the base to the open measured 2½ by 1½ inches wide. Specimens in one clump were semi-donble and had in some instances the sepals petaloio and more or less white. Some violets were in splendid condition. *Viola brauda* was remarkably fine and in such enormous abundance as to scent the air. *Viola affinis* grew in the crevices of the rocks beside the river. In a creek bottom *V. cucullata* was very beautiful. *V. prionosepala* was also collected at the edge of the woods as well as *V. Dicksoni*. *Corylus Americana* was added to the flora of the district, by Prof. Macoun. Dr. Fletcher found an interesting hybrid between *Osmunda claytoniana* and *Osmunda cinnamomea* growing in a clearing where both of these ferns were very abundant. The strawberry blossoms (*Fragaria Virginiana*) presented a strange appearance in one place ; the petals were modified so as to bear anthers at their tips, and could be seen in all stages of transition from petals to anthers. Although spring only began on the 1st of May, this season's growth has been very rapid.

The Ostrich Ferns in the alluvial soil of the river bottom were fully five feet in height, and so dense as to resemble a picture of tropical vegetation. *Phlox divaricata* was found; but the splendid beds of this beautiful flower which formerly occured on the south bank of the river have been almost destroyed by the forest fires—On the north bank clumps of *Rudbeckia laciniata* were found in one spot. The only land shell of interest was *Helix Sayi.*

The SECOND GENERAL EXCURSION was held on May 28th to Gilmour's Grove, Chelsea. Through the kindness of Messrs. Gilmour and Hughson, the beautiful grove overlooking the grand rapids on the Gatineau River was thrown open to the club, and about 200 members and their friends took the opportunity of again investigating this rich locality. The day was simply perfect for such an outing, and many interesting specimens rewarded the collectors. Mr. Arthur Gibson and Mr. D. A. Campbell captured many insects of interest; among these, *Thecla niphon*, *Amblyscirtes samoset* and *Nisoniades juvenalis* may be mentioned. The botanical treasures as usual were most numerous among the collections. *Cypripedium acaule* was found in small numbers; other orchids exhibited at the end of the day were *Orchis spectabilis* with the whole flower purple, and *Habenaria Hookeri; Viola prionosepala* carpeted the woods in one place. A prize offered for competition by Miss Cowan for the largest number of species observed, was won by Miss Constance Anderson. Several ferns were collected, and Miss K. Lee exhibited fine plants of *Woodsia Ilvensis*, and *Asplenium Trichomanes* Dr. Fletcher showed a specimen of *Botrychium matricariæfolium*, of species which had only once before been found in the district, at Casselman, many years ago.

At 5 o'clock the President, Mr. W. T. Macoun, called the meeting to order and the usual addresses were given. Mr. Macoun spoke shortly of the objects of the club and urged the claims of the club for more general support by all interested in Natural History and Nature Study. He spoke also of some of the trees growing in the locality. Dr. Fletcher spoke of some of the plants collected and gave information about specimens handed in.

Mr. D. A. Campbell spoke of and exhibited some of the insects collected during the afternoon and dealt with the habits of tiger beetles, dragon flies and other insects, also with the methods of collecting, killing and preserving insects.

Dr. S. B. Sinclair spoke of the pleasures to be gained from such meetings as the club gave opportunities for, and at his request the party had the pleasure of hearing the ladies and gentlemen of the Normal School present sing "Sweet and Low," which was done with great taste and was much enjoyed by all.

Mr. Congdon, of Malone, N.Y., on invitation of the President, expressed his pleasure at being a participant in the excursion and of the value of Nature Study to which he had given some attention in his professional work as a teacher. T. E. C.

CONCHOLOGICAL NOTES.

MARGARITANA DELTOIDEA.

Some years ago, while looking over a box of "dead" shells collected in the Rideau Canal above Hartwell's Locks, I was surprised to find among them a single specimen of *Margaritana deltoidea.* Although the species might from its known range be expected to be found in the vicinity of Ottawa, I concluded, as I had not observed it previously, that the specimen must have been placed with the canal shells by the busy but unscientific little hands that occasionally find occupation in my cabinets. I was confirmed in this conclusion by the fact that a search, made under favorable conditions in the locality in which the box was collected, was fruitless so far as this particular species was concerned.

Last summer, however, while trout fishing on the South Branch of the Quyon River, near Thorne Centre in the county of Pontiac, I found a living example—and but one—of this interesting little pearl bearer. It may occur in other places near Ottawa, and is, I am now inclined to think, to be found in the Rideau Canal.

In any case it should be added to our list as occurring in the Quyon. In outward appearance it resembles a small specimen of the common brown clam, *Unio complanatus.*—F. R. L.

INTRODUCED MOLLUSCA.

It is well known that the eggs of many species of mollusks, as well as the mollusks themselves, are highly resistant to heat and cold, and that some endure desiccation extending over long periods of time. The eggs are frequently deposited among the roots and stems of grasses and plants. Several species have been widely distributed in the straw used for packing articles shipped from Europe to this country. I have no doubt that *Helix cantiana*, which abounds at Quebec in restricted localities near the Citadel and the Observatory, originated in the packing material thrown over the walls of the fortress and on the declivity above the Cove Fields. Two notable importations were brought to my notice some time ago. One was the large European slug, *Limax maximus*, L., which was found by Mr. Scrim in one of his conservatories at Ottawa. The animal had an extent of over four inches, and would in large numbers be very destructive. Fortunately it occurs but rarely and is easily seen. But the other, *Zonites alliarius*, is a much more serious pest. It is minute in size and occurs in considerable numbers. Mr. Scrim finds it chiefly in the greenhouse devoted to the cultivation of palms, ferns and selaginellas. The lace-like traceries wrought on the under surface of a leaf betray the presence of the tiny operator and result in his destruction. When crushed by the horny-handed toilers in the greenhouse, the animal gives forth with its dying breath a strong and surprisingly permanent odur of garlic. Hence the specific name—*alliarius*, L.—F. R. L.

I have received from Mr. G. A. Knight, of Mount Tolmie Nurseries, Victoria, B.C., specimens of this European Mollusk which he has found in some numbers in his greenhouses.—J. F.

NATURE STUDY—No. XV.

HOW TO COLLECT AND PRESERVE PLANTS.

By W. T. MACOUN, Horticulturist, Central Experimental Farm, Ottawa, Ont.

While Nature Study does not necessarily involve the accumulation of natural history specimens for the purpose of forming a herbarium, a collection of insects or of bird skins, the making of a collection is undoubtedly of great value both as a means of bringing the student into closer contact and more intimate acquaintance with natural objects, and of inducing a continued and well directed study of them. If one decides to make a collection, it is of the greatest importance that he begin in the right way. It frequently happens that young people, and adults as well, in their enthusiasm, begin collections ; but, through ignorance of the best methods of collecting and preserving their specimens, these are improperly made, or, through not knowing the way to preserve them, are soon destroyed by insects, and the collector's enthusiasm is dampened. It is then difficult to get him to start again.

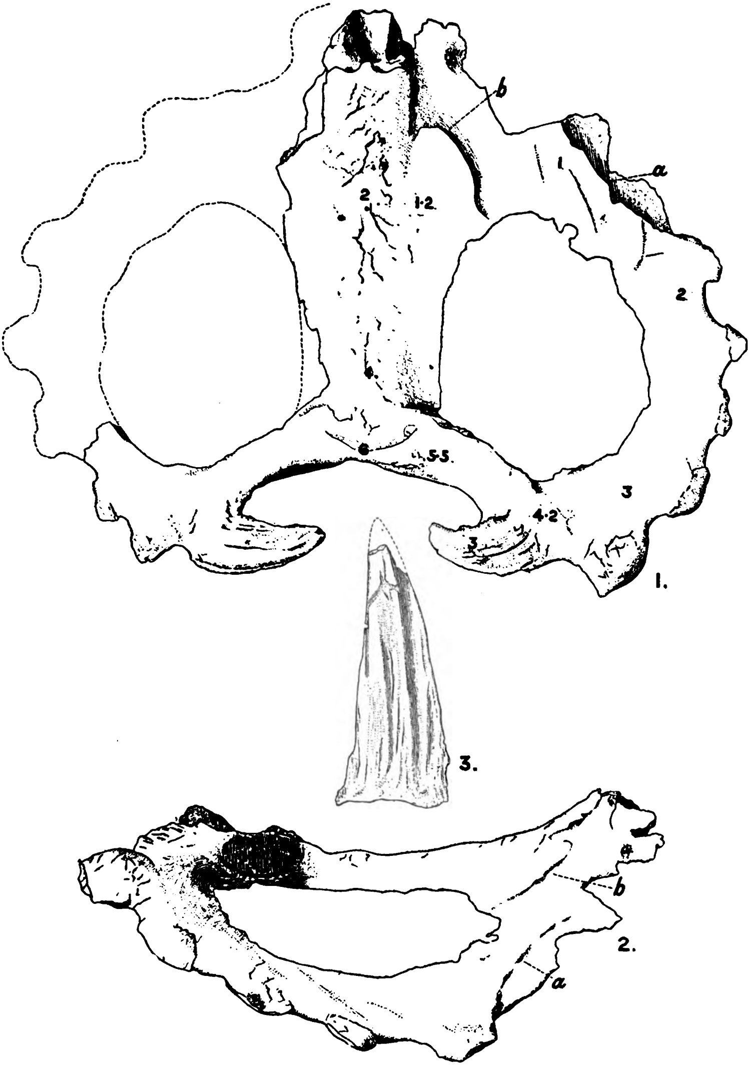
It was felt by the Council of the Ottawa Field Naturalists' Club that very useful work would be accomplished by giving a demonstration of the best methods of collecting and preserving natural history specimens so that anyone who wished to begin a collection might do so in the right way. Accordingly, a special meeting of the Club was held on April 26th, 1904, and demonstrations were given by experts in various branches of science. Mr. A. G. Kingston described his methods of observing and identifying birds with a field glass. Dr. Jas. Fletcher spoke on the advantages of the study of Entomology. Dr. H. M. Ami discussed the collecting and preserving of geological specimens. Demonstrations were given of the mounting of plants by Miss Macoun ; of insects, by Mr. A. Gibson and Mr. W. Metcalfe ; inflating caterpillars, by Mr. C. H. Young ; preparing geological specimens, Mr. Geo. Burland.

In addition to the addresses and demonstrations already referred to, Prof. J. Macoun told how to collect, mount, and preserve botanical specimens, and, in order that as many as possible may get the information thus given by him, the most important points with regard to collecting and preserving, are made the subject of this Nature Study article, and it is hoped that the other addresses which were given will be published also.

Prof. Macoun said that it was necessary, first of all, to have the desire to make a collection of plants before beginning the work. Unless the student had the desire, little benefit would be derived from it. A good herbarium was a proof that there had been a desire. In collecting plants, it is not very important what they are carried in while out in the field, providing they do not wilt before pressing. The lack of a tin case should not deter one from getting specimens, as a basket answers the purpose very well; but the best practice is to put the plants when collected into the plant press at once. A trowel or a strong knife are convenient for digging up the plants; but these again are not really indispensable, as strong fingers will dig up almost any specimen. A good plant press is a necessity, and it should be light and strong. A very strong press is made with two boards, each made of three pieces of wood nailed together. Each piece is very thin, but great strength is obtained by having the middle piece with the grain crosswise. Joined in this way the boards will stand all the pressure they will get without breaking. When taken to the field, the boards may be kept in place by means of a stout shawl strap, by which also sufficient pressure can be given. If possible, there should be two extra boards at home made of ordinary inch wood, between which the plants may be put the day after they are collected, aad pressed by means of a strong strap or some heavy weight. When one is going on a collecting trip, enough papers should be put in the press for all the specimens that are likely to be obtained; but, the lighter the press, the better. Newspapers cut to about the size of the press or a little smaller and of a single thickness of paper are very convenient for putting the plants on, and filter paper or blotting paper for covering the specimen and to absorb the moisture.

When one is making a collection, it is well to try and obtain a typical and perfect plant of the species, as, once an inferior specimen is dried and mounted, one is not likely to get a better one, and perfect specimens add very much to the attractiveness and value of a herbarium. It is sometimes puzzling to the beginner to know what is a good specimen, as a sheet will apparently only take a plant of a certain size. If the plant is a small one, the whole of it should be taken, the roots being carefully separated from the soil so as to injure them as little as possible. If flowers and fruit can be obtained on the same specimen, so much the better; but usually it is necessary to collect a plant when it is in full flower, and then when the fruit is nearly or quite full grown. In order to get the whole of a large plant on a sheet, it may be bent either once or twice, in order to do it. It is much better to do this than to lose the roots or root leaves, the latter especially being sometimes necessary in identifying specimens. If the stem or root of a plant is thick, it may be cut down its centre, leaving one side intact. Specimens of trees and shrubs may be made of branches a little smaller than the sheet, the important point being to get the whole of the flower cluster, if possible, and one or more well developed leaves. When a plant is laid on the piece of newspaper in the press, the temptation is to spread the leaves out carefully to prevent their creasing. This is a great mistake and many a fine specimen has been spoiled in this way. Some plants will stand such treatment, but many will not. As a rule, the most satisfactory way to do, is to lay the plant on the newspaper, placing the leaves or flowers so that the specimen will look fairly symmetrical and then without trying to take out all the creases in the leaves, put on the filter paper or blotting paper and press the specimen with the hand or between the boards if there is only one plant to put in. The next day, when the plant has wilted, some of the creases can be readily smoothed out; but, after the plant is pressed, these are not noticed nearly as much as when fresh; and, indeed, they sometimes look better, as when the under side of the leaves show here and there, it makes a pleasing contrast, and it is important also at times to show the under side of the leaf as well as the upper side. Some of the more delicate ferns may be dried with advantage between two pieces of newspaper, the drier being put on top of the newspaper. This avoids disturbing the specimen when changing the driers, as the upper piece of newspaper need not be removed until the plant is dry. The specimen when once laid on the newspaper should not be removed from it until it is dry. When a plant is wilted and not dry, it is very difficult and sometimes impossible to replace the specimen without injuring them. An exception may be made with very succulent plants or fleshy plants, when both upper and lower papers should be changed to get rid of the moisture as soon as possible, and sometimes it is necessary to dip the plant in boiling water in order to kill it. Some plants retain their colour fairly well, even if improperly dried, but the majority lose their original colour unless they are dried quickly and properly. Plants should be dried as rapidly as possible after the first day, and in order to do this the driers should be changed at least once a day and, if possible, twice at first. After the first day or two, when the excess of moisture has been removed, the hotter the driers are, the better the results will be, and, in order to have the driers quite hot, they should be heated on or at the stove and put on the specimens at once. If it is not convenient to heat the papers in this way, they may be dried outside and not especially heated. As some plants dry much quicker than others, the best results will be obtained if a thin piece of wood is kept between the plants which are in different stages of drying, as, if this is not done, a plant which would dry very quickly is kept moist by others of a more succulent nature. Some plants will dry in two or three days, and some take nearly two weeks. One can easily tell by the touch when they are dry.

Many a collection of plants has been ruined by insects after it has been made, and the enthusiasm of the collector may die with the loss of his specimens. The poisoning of plants after they have been dried should never be neglected, and the sooner it is done, the better. One of the best formulas for this purpose is : Corrosive Sublimate 1½ drachms ; carbolic acid, 1½ drachms ; alcohol, 12 ounces. A small brush is used to apply the poison which should be painted over all the plant that is exposed, the flowers especially getting a full share, as the insects will frequently destroy the flowers when they will not injure another part. Alcohol is used instead of water, as it evaporates without leaving a stain on the paper.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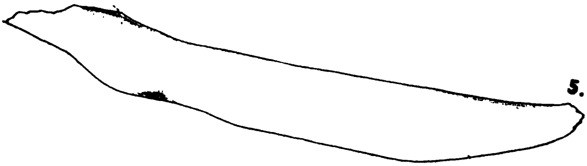

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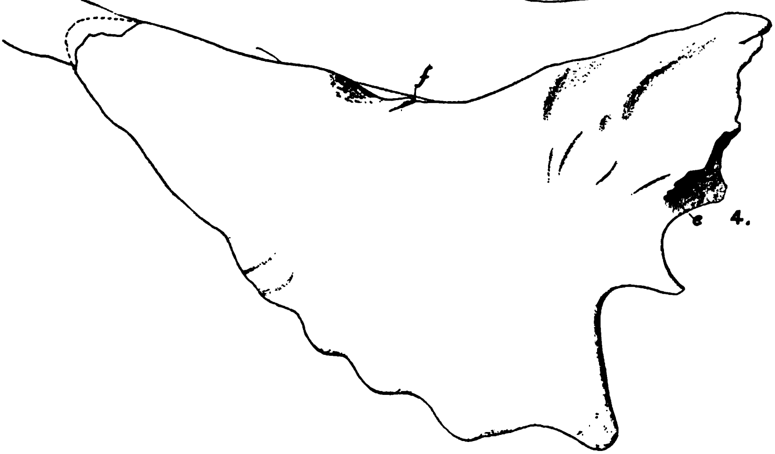

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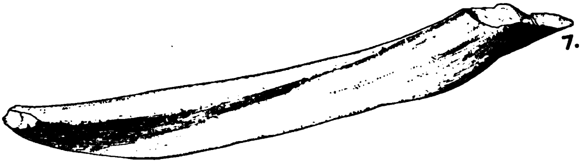

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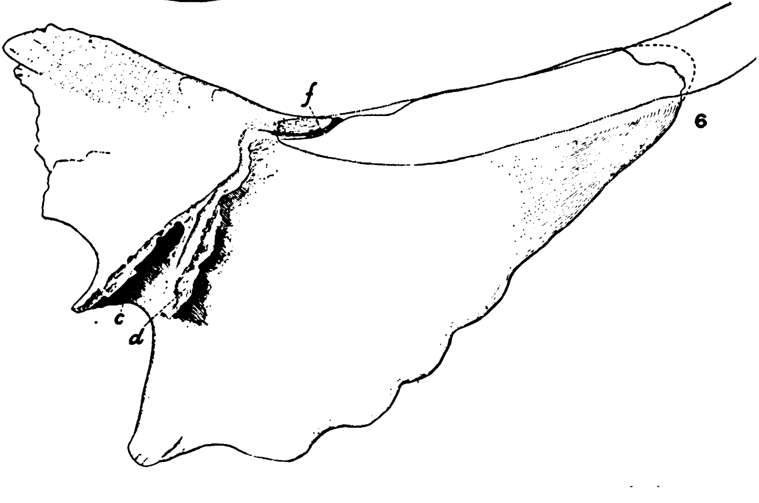

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THE OTTAWA NATURALIST.

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NOTES CONCERNING NEW BRUNSWICK WARBLERS.

By WM. H. MOORE, Scotch Lake, N.B.

BLACK AND WHITE WARBLER, *Mniotilta varia.*

Common during migrations, and quite a number breed, at which time they are partial to moist woodlands having thick underbrush. The spring migrants arrive during the first half of May. In 1898 the first arrivals were noted May 13th. In 1902, May 9, the first were heard singing their soft unattractive song, which is merely a few notes sounding we-see-we-see-we-see, uttered four or five times. The birds seem too busy searching about the bases of trees and stumps to pay any particular attention to a song.

Although I have never found a nest of this species, the young have been observed when apparently away from the nest only a day or two. They were five in number and were being fed by both parents. They were in a young scrubby second growth of conifers along a steep bank of a brook. They migrate southward in September, but at that period the plumage is not so plainly streaked as in springtime.

GOLDEN-WINGED WARBLERS, *Helminthophila chrysoptera.*

In June 1903 a bird of this species was observed in the vicinity of Fredericton.

NASHVILLE WARBLERS, *Helminthophila ruficapilla.*

The species arrives from the south about the same as *M.varia*, during which period they are tolerably common. It is a pretty common summer resident in the central part of the province, but rare in the countries bordering the Bay of Fundy. It breeds about partially cleared tracts. One nest found July 15th was placed in the side of a small mound, and was well concealed by mosses and overhanging ferns. The nest was composed of grasses and moss and lined with fruit stems of hair moss. The female flushed from the nest and disappeared among the numerous, small evergreen bushes that grew near the nest, nor did she put in an appearance during the half hour I stayed near. The nest measured, outside diameter 3 inches, inside 1.75, outside depth 2 inches, inside 1 inch, and contained three eggs, white, marked with rufous and cinnamon-brown, chiefly about the larger end.

TENNESSEE WARBLER, *Helminthophila paregrina.*

Have observed this rather rare species but have never become acquainted with its habits. It arrives late in May or early June.

PARULA WARBLER, *Comsopthlypis americana.*

A fairly common migrant and summer resident, arriving here the first half May. Its shivering skew-ee-oo song is most often emitted from a high perch in tall trees. The writer has found two nests of this species, one of which was situated forty feet up in a yellow birch tree, the other was twenty feet up in a beech. Both nests were made in *Usnea* lichen where it hung below the limb on which it grew. The lichen had been shaped at a distance of four to six inches below the limbs, and sewn with horse hairs to keep in shape for a nest. The cavity of the nest in the beech measured an inch and one half in both depth and diameter, and contained four eggs, white with rufous markings about the larger end.

The last bird observed during 1902 was on September 17th.

CAPE MAY WARBLER, *Dendroica tigrina.*

As a rule this species is a rare summer resident. But during the summer of 1902 it was tolerably common. The first spring migrant recorded that season was on May 17th. It frequents young evergreen thickets, and in such places one may hear their seep. seep, seep, seep, of a song and the bird be entirely hidden from view.

YELLOW WARBLER, *Dendroica æstiva.*

After May 20 this species is a common summer resident along the river valleys, where it breeds in the shrubbery and is especially partial to roadside tangles of willows, alders, and rosebushes. The nests are compact structures built of plant fibres and grasses, somewhat felted together with down from the fruits of the willows and poplar trees. Several nests observed were within three feet of the wheel tracks of highways. Nests of average size measure 1.75 inches in depth and diameter, inside, 3 inches in outside diameter. From three to five eggs complete a set. Both birds engage in incubating, which period lasts from ten to twelve days. This species of warbler I have never observed on the highlands back from the river valleys. They depart southward in September.

BLACK-THROATED BLUE WARBLER, *Dendroica cærulescens.*

About the middle of the month of May, if we happen to be in the vicinity of mixed-growth woodland, we will be likely to hear a song of zye-zye-zye, and will know that the black-throated blue warbler has arrived for its summer sojourn with us, during which season it is tolerably common. A nest of this species found July 21 was built of bark and fibres, in a small beech bush two feet up. The cavity of this nest measured 1.50 inches in depth and diameter and contained three eggs, white with obscure olive-brown markings about the larger end. As the writer passed this nest, the female flushed from it, and apparently with several wings and legs injured and dragging she fluttered about endeavouring to allure her disturber from the nest. The male kept quietly at a distance of about ten yards.

These birds are quite expert fly-catchers and may often be seen tumbling through the tree tops in pursuit of insects.

MYRTLE WARBLER, *Dendroica coronata.*

This species is the first of the warblers to arrive during spring migration, at which time it is not uncommon. During the autumn migration it is very common, and a few breed in central New Brunswick. Ordinarily they are with us from April 20th until September 25th. They are expert fly-catchers, and keep more to the fields in which bushes grow, than do any of our other warblers. One nest found was placed six feet up in a tamarack bush and contained four eggs. The birds are very much concerned when one is in the vicinity of their nest.

MAGNOLIA WARBLER, *Dendroica maculosa.*

Common summer resident, arriving after the middle of May. During the mating season the males are pugnacious little fellows, and many fights do rivals have. They attack each other with much fierceness, seizing hold with their beaks, and hitting with half-opened wings they sprawl about on the ground, until thouroughly overcome.

When pressing his suit to the female of his choice, the male displays his colors to great advantage, as they show in fine contrast among the bright green foliage of the trees. During the nesting season they frequent bush-grown pastures and such places. The nests are rather roughly constructed of grass stems, and lined with hair and grass blades. The cavity measures in depth and diameter 1.50 inches. During the early part of June 1903, a pair built a nest in two days, most of the material being taken from a deserted nest of *Spizella socialis.* The eggs which are from three to five in a set are white, marked with olive-brown and cinnamon. Both parents engage in incubation, the time required being twelve days. The parents are rather shy when one is in the vicinity of the nest, and will often slip quietly from the nest, as the observer approaches, but in the protection of the young they display more courage, and concern. The song which sounds like chee-chee-chee-chee-oo although not amounting to much in quality makes up the deficiency in quantity, and is sung by the male from the time of arriving in May until the young are nearly fledged in June.

CHESTNUT-SIDED WARBLER, *Dendroica pensylvanica.*

In this section one of the late arriving warblers, not being observed until late in May. In 1898 the first noted was May 19th. This species is a rather rare summer resident, and is found mostly about the scrubby edges of woodlands in rather moist places. The male has a beautiful song much like that of the yellow warbler. He also displays great anxiety if one approaches the near vicinity of the nest.

BAY-BREASTED WARBLER, *Dendroica castanea.*

Ordinarily this species is very rare here but during the summer of 1903, it was with us in goodly numbers, and several pairs were known to breed in the vicinity of Fredericton. The nests were composed of small twigs, bark, etc., and lined with hairs and other fine material. Of two nests that came under the notice of the writer, one was built in a small cedar, about five feet up, and contained five eggs. The other was built in a spruce, thirty feet up, and twelve feet out on a limb, overhanging a brook, and contained six eggs, which were whitish with dark spots; the ground color had a pale bluish-green tinge. The parent birds showed little anxiety while observers were near the nest, in fact one male continued his singing in nearby tree tops. The female of this pair had very little of the bay colour showing in her plumage.

BLACK-POLL WARBLER, *Dendroica striata.*

A rare species here; has been observed at St. John and near Fredericton during the spring migration.

BLACKBURNIAN WARBLER, *Dendroica blackburniæ.*

This beautiful bird is a tolerably common summer resident, and is a bird of the woods, seeming to be partial to tracts where hemlocks grow. On one occasion the writer observed a female feeding young which were able to fly well, the time of year being June 27th. The song of the male sounds like the syllables wesee-wesee-tse-tse-tse. But the song varies with different individuals.

BLACK-THROATED GREEN WARBLER, *Dendroica virens.*

This is a fairly common warbler of the woods from the first day of May until September. The male is a very ambitious singer, and from its arrival until July 15 it occupies much time by pouring forth its attractive song which, anglicized, sounds like zye-zee-zye-zee-zee. Although this bird is fairly common, I have learned but little of its nesting habits while with us.

YELLOW PALM WARBLER, *Dendroica palmarum hypochrysea.*

This species is a spring migrant at Fredericton and near St. John.

OVENBIRD, *Seiurus aurocapillus.*

A common bird of the woodland, where one may know of its presence by hearing the melodious, attractive, and seemingly ventriloquous song of the male which rings through woods and groves sounding like p-chup p-chup p-chup p-chup often extended to eight or ten syllables. These birds feed largely on the ground where they walk about, instead of hopping as do most other small birds.

The nest of this species is built upon the ground, sometimes partially concealed by a bush or other plants, but sometimes without any attempt at concealment, and is composed of leaves and fibres compactly woven and the cavity covered over, so that the entrance is at the side. The eggs number from three to five, and are white, speckled with cinnamon or rufous-brown. The female is a very close sitter and will almost allow one to step upon the nest before she will betray its presence by taking flight. When disturbed she flutters from the nest in an apparently helpless condition, trying to allure her enemies from her home. The sexes are the same in color of plumage. They may easily be mistaken for thrushes which they much resemble, but are somewhat smaller, than those birds are when adult.

WATER THRUSH, *Seiurus noveboracensis.*

A common bird of swamps and water courses. With us from mid-May until October. We first know of its arrival in spring by hearing the male pouring forth his loud, sweet, liquid song, from some high perch in a tree along a brook. He sings most enthusiasticaly while his mate is searching about on the ground, gleaning some choice material with which to build a nest. His loud song without a doubt calls the attention of enemies to himself, and leaves his mate with less watching for her own safety at that season. During autumn migrations they often stroll about buildings in search of flies or other insects, that may be partially concealed in crevices.

MOURNING YELLOW, *Geothlypis philadelphia.*

This species has been observed in Westmoreland county by Mr. J. Brittain.

MARYLAND YELLOW-THROAT, *Geothlypis trichas.*

A not uncommon summer resident from the middle of May until September. They prefer thickets along water-ways and damp places, and from such places the male sends fort his wichity, wichity, wichity, sounding song. This species gets quite excited, at any disturbance in its near neighbourhood, and generally seeks to solve the cause of disquiet with much chipping and purring about through the intervening shrubbery.

WILSON'S WARBLER, *Sylvania pusilla.*

Has been taken at Petitcodiac and observed at Fredericton.

CANADIAN WARBLER, *Sylvania canadensis.*

A tolerably common summer resident from May until September. Generally found in low, wet woodland that has considerable undergrowth; it is also found along river margins. This species has a sweet, liquid song, we would write it chip-it-che chip-it-che chip-it chitt-it-it They display great anxiety if one intrudes too closely upon their nesting site, and give vent to their feelings by repeatedly uttering a smart sounding chip. Yet they can overcome their emotions sufficiently to make short sallies after passing insects which they easily catch.

AMERICAN REDSTART, *Setophaga ruticilla.*

A tolerably common summer resident of orchards and moist woodlands near clearings, staying with us from May until September. The habits of this pretty species are very much like those of some of the flycatchers, both in manner of taking its food, and nest building. They are expert fly catchers, as one may know by watching them for even a short time, as they float, dart and whirl through the foliage of the trees, occasionally resting with drooping wings and half spread tail, to sing their chee-chee-chee, ser-wee, swee-e-e. The song of the immature male during his second summer is very different from the song of the adult male. At that age the young male still more closely resembles the female in appearance, than he does with the black and dark orange colors of the plumage of the older males.

The nest of this species is built, like the nest of the least flycatcher, of grasses, fibres, plant down, and threads, if obtainable, placed in a fork of a bush either close against the trunk or out on a limb. The eggs are from three to five in number, grayish white or bluish white, with cinnamon or brownish spots about the larger end. The parents are very vigilant in guarding their eggs and young. On one occasion when I was driving along a highway, a male redstart fluttered out from the vicinity of its nest, and fluttered along beside the horse endeavouring to allure us from the place. His plumage of rich orange and black showed to good effect against a background of rich green grasses and shrubs.

MEETINGS OF ENTOMOLOGICAL BRANCH.

Meeting No. 14 held at Mr. MacLaughlin's, on February 24th, 1904; five present. Mr. Harrington exhibited Ottawa coleoptera belonging to the families Ptinidæ, Lampyridæ, Malachidæ and Cleridæ. Many species of the Ptinidæ are injurious to various trees, boring especially in injured specimens: other forms destroy certain kinds of hardwood timber, also various drugs and dry vegetable substances, etc. The Lampyridæ are chiefly carnivorous in the larval stage, feeding frequently upon snails; the beetles are rather soft and unattractive in appearance, except those forms known as fire flies, which attract attention during their nocturnal flights by the bright flashes which they omit from certain segments of the abdomen. The Cleridæ are prettily marked beetles, which are predaceous in both the larval and the perfect states. Mr. Metcalfe said that he had observed *Clerus 4-guttatus* and *Thanasimus dubius* feeding upon a large plant-louse infesting pines. Mr. Harrington also showed a large handsome fly, which he identified as *Alophora magnapennis*, recently described in Psyche by Mr. Johnston from a specimen collected by Mr. Chagnon, of Montreal. Mr. Harrington's specimen was collected in 1902 in the Beaver Meadow, Hull. Mr. Gibson exhibited the following moths, which had been taken or bred for the first time in Ottawa—*Papaipema harrisii*, *Semiophora opacifrons*, *S. climata*, *Hillia crassis* and *Homoglæa hircina*. He also exhibited, on behalf of Dr. Fletcher, a fine pair of the large and rare beetle *Dynastes grantii* from Phœnix, Ariz., and read an interesting note on these so-called Goliath beetles.

Meeting No. 15, held at Mr. Baldwin's, March 10th, 1904; six present. Dr. Fletcher showed an advance copy of the Annual Report for 1903 of the Entomological Society of Ontario, which seems fully up to the high standard of these publications. It contains a capital portrait of the Rev. G. W. Taylor, formerly one of the Leaders of our Club, and now doing excellent work in Vancouver Island, especially in the geometridæ. Among the papers in the Report are one by Dr. Fletcher on the Insects injurious to Ontario crops in 1903, and one by Mr. Gibson on Basswood

Insects. Mr. Metcalfe read a list of Brockville *homoptera*, mostly determined by Mr Van Duzee and containing many good species; the total number being 56, in 27 genera. Mr. Baldwin exhibited a fine example of the California Trapdoor Spider, *Ctenisa californica*, and its subterranean nest. Mr. Harrington showed a box of European coleoptera and colored drawings of over 100 species of Ottawa beetles. Mr. Gibson exhibited 13 species of moths of which the larvæ bore in the stems of plants, and also inflated larvæ of several species. He explained that much work had been done on these forms of late, especially by Mr. Bird, who had reared many of the species. Mr. Lyman of Montreal, and others, were also now studying them and developing their life histories. *Papaipema cerussata*, the larva of which was first discovered by Mr. Lyman as a borer in *Thalictrum*, was common at Meach Lake in the common dock (*Rumex occidentalis*), and *P. cataphracta* infests burdock, lilies, potatoes, etc. The following species were shown:—*P. cerussata*, *P. impecuniosa*, *P. duovata*, *P. rutila*, *P. marginidens*, *P. cataphracta*, *Gortyna immanis*, *G. stramentosa*, *G. obliqua*, *G. velata*, *Achatodes zeæ*, *Macronoctua onusta* and *Sphida obliqua*.

Meeting No. 16, held at Mr. Harrington's, March 24th, 1904; four present. Mr. Gibson exhibited an interesting photograph taken by Mr. Lyman of a gathering of entomologists in the arboretum of the Experimental Farm, on the occasion of the meeting in Ottawa of the Entomological Society of Ontario last autumn. He also showed larvæ of the small mosquito *Aedes smithii*, Coq., from the Newington Bog. Similar larvæ had been taken at the Mer Bleue in pitcher plants. Dr. Fletcher exhibited a box of hymenoptera from Mr. Cockle, of Kaslo, B.C., and apple twigs infested by San Jose Scale, or with infestations which had been mistaken by correspondents for the San Jose Scale; such as the Oyster-shell Scale; a fungus remarkably similar in appearance to the genuine scale; and such a dissimilar infestation as a twig covered by the scars made by the Buffalo Leaf-hopper in ovipositing. He showed also axe-handles destroyed by the Powder-post Beetle, *Lyctus striatus*, with specimens of the larvæ, pupæ and beetles. Mr. Harrington exhibited beetles belonging to the Lucanidæ, Scarabæidæ and Cerambycidæ.

Meeting No. 17, held at Dr. Fletcher's, April 14th, 1904 ; ten present. Dr. Fletcher suggested that a portion of the time be devoted to considering the work to be done during the season then commencing, and made some useful suggestions as to the labelling, etc., of specimens, so as to make them really of value in subsequent studies. Mr. Gibson read a paper on *Abbotana clemataria*, the Clematis Looper, in rearing which different food plants had been tried ; elm leaves having been preferred. Dr. Fletcher exhibited samples of boxes, labels, electric pocket-lantern, etc., Lord Walsingham's beautifully illustrated "Pterophoridæ or Plume Moths," and Bulletins of the Agricultural College of Tokio, Japan, with fine plates of silk-moths, etc. Mr. Metcalfe exhibited some rare homoptera and Mr. Harrington some Ottawa coleoptera and some hymenoptera from France.

Meeting No. 18, held at Mr. Gibson's, on May 4th ; five present.

Mr. Metcalfe showed 17 species of Hemiptera taken at Ottawa early the present season. He also showed a collection of Hemiptera, Diptera and Coleoptera collected at Brockville in the summer of 1903.

Mr. Baldwin showed some common larvæ which he had gathered, viz., *Noctua c-nigrum*, *Mamestra lorea* and *Ctenucha virginica*.

Dr. Fletcher gave an interesting account of the habits of *Erebia vidleri*, and showed some young larvæ which had recently hatched. This rare butterfly, as far as is known, only flies on the summits of Mount Cheam in British Columbia. Dr. Fletcher also spoke of the moths of the genus Xylina and showed examples of those species which occur at Ottawa. A new species which has just been named *Xylina fletcheri* was of special interest.

Mr. Gibson showed a number of living caterpillars which he had collected and spoke of certain traps which he used in order to get specimens for breeding. The breeding of insects is a fascinating part of the study and one in which there is a wide field for original research.

THE FERTILIZATION OF CALOPOGON PULCHELLUS.

By A. B. KLUGH, Secretary, Wellington Field Naturalists' Club, Guelph, Ont.

This beautiful orchid is an inhabitant of open bogs, and where it finds a deep bed of Sphagnum with plenty of water beneath, flourishes in great profusion. The outstanding characteristic of this species, which easily distinguishes it from any other of our *Orchidaceæ*, is the position of the labellum, which, on account of there being no twist in the ovary, is uppermost. This peculiarity is noted by Gray, but in Britton and Brown not only is no reference made to it in the text, but the diagram is incorrect, as it shows the column uppermost. The representation of the labellum, which is given separately, is also erroneous as the triangular dilation at the base is omitted, as are also the bracket-like ridges.

On account of the unique position of the labellum and the very open character of the flower, I thought that the method of fertilization would prove interesting and determined to investigate it. The way in which it is accomplished is as follows :—The bee alights upon the labellum, which bends near the base (the three bracket-like ridges prevent it doing so elsewhere) until the back of the bee is in contact with the column. The bee, which is of course up-side-down, sups the nectar secreted by the glands at the base of the column. As it withdraws, its back opens the operculum of the anther, and a pollinium (or several) adhers to its back. On visiting the next flower the pollinium slips past the convex surface of the closed operculum, but as the bee withdraws, the pollinium is caught by the slight beak of the stigma and adheres to it, the bee meanwhile receiving another pollinium from the anther of this flower.

THE BROWN PELICAN ON CAPE BRETON ISLAND.

In a letter dated July 5th, 1904, Mr. Harry Piers writes :— A short time ago I secured for the Provincial Museum at Halifax, N. S., a Brown Pelican (*Pelecanus fuscus*) shot at Louisburg, Cape Breton, on May 19th, 1904. The taxidermist says that it is a male.

Like the Man o'War bird and the Yellow-billed Tropic bird, the Brown Pelican is a southern and purely marine species, which occasionally strays as far north as the maritime provinces of Canada. But, in Canada, so far, the Brown Pelican has been found only in Nova Scotia.

J. F. WHITEAVES.

"Hints on Making Nature Collections in Public and High Schools" is the title of a bulletin recently issued from the Ontario Agricultural College and Experimental Farm. Its author is Dr. W. H. Muldrew, the Dean of the Macdonald Institute. The bulletin is intended as a guide to teachers and pupils in the making of collections of natural history specimens and with the help of admirable illustrations Dr. Muldrew has succeeded in compressing into a small compass very clear and easily understood directions for the preparation and preservation of natural history specimens and young students in botany and entomology especially will find this bulletin of great service to them. School gardens also receive attention and in describing the methods of making a collection of living objects Dr. Muldrew has been careful to choose objects which are easily procured and which may be cared for with little trouble. By following his directions any one may maintain a small aquarium at insignificant cost.

A very important section of the bulletin is that which deals with the making of historical collections. This is a matter which has been sadly neglected in Canada and there is no district which will not contribute something of historic value if properly studied. If nothing more than a few arrow-heads or an old musket, these are well worth preserving if reliable data regarding them can be procured.

NATURE STUDY—No. XVI.

HOW TO MOUNT PLANTS AND COMPLETE THE HERBARIUM—PRACTICAL RESULTS FROM THE STUDY OF PLANTS.

W. T. MACOUN, Horticulturist, Central Experimental Farm, Ottawa, Ont.

In the July number of THE NATURALIST (Nature Study—No. XV) an attempt was made to describe the best methods of collecting and preserving plants. In the following pages the way to mount plants is described, as, even if the specimens are well preserved, they will be difficult to handle unless they are properly mounted on convenient sheets. A few suggestions are also given for the completion of the herbarium, and reference is made to the practical results which may be obtained from the study of plants.

There is considerable art in the mounting of plants, and much individual taste may be shown. Plants should not, however, be mounted with the main purpose of making them look attractive on the paper. Where possible, flower, fruit and root should be shown on the one sheet of paper, but never more than one species; and, if the flower only is obtained the first year, space should, if possible, be left for the fruiting plant. Another important point to be taken into consideration, is the way the plants will lie when piled together. If the roots are always put at the bottom of the sheets, the pile will not be level, but by placing the specimens now on one side and then on the other, or by mounting the specimens in various places on the sheet and, when the plant is large, having the roots sometimes come at the top of the sheet, the pile may be kept level, which will make the collection much easier to handle. The standard size of mounting paper is 11½x16½ inches; but a more economical use of paper may be made by having it 11x16 inches, as, at this size, one large sheet of paper will just make four sheets of mounting paper. There are many grades of white paper, and, if the collector can afford it, it is wise to get it good, the kind known as Bristol-board being very satisfactory. Good mounting paper may be obtained from Mr. F. W. Hodson, Dominion Live Stock Commissioner, Ottawa, at 50 cents per hundred sheets. With experience, plants can be mounted quickly and neatly; but, when beginning this work, the greatest care should be taken, as otherwise one is liable to daub the paper with glue or not get the specimens firmly fastened. Chase's and Le Page's liquid glue are very satisfactory for mounting, but both of these preparations should be diluted with vinegar before using. To mount most plants, place the specimen on blotting paper, under side up, then hold the specimen with one hand, and with the other glue the stem, leaves and flowers or fruit; then, pick the specimen up, turn it over and place it on the mounting sheet in the position it is to go; now take three or four newspapers, and with them press the specimen down with a gliding movement of the hand. If one is expert and can mount rapidly, three or four specimens may be mounted and then placed under a light weight, it being very important to have the weight as large or larger than the sheet, so that the specimen will be pressed evenly; but, if one is only beginning to mount, it is wise to put each specimen as mounted under the weight. A large book placed on a sheet of heavy paste-board makes a very good weight. Plants which are not easy to handle, such as delicate ferns, may be laid on a clean sheet of blotting paper under side up and the glue applied as before; but, instead of lifting the specimen, take the mounting paper and lay it on top of the specimen and then press it. In order to make specimens with large stems more secure, strips of thin gummed paper about one eight of an inch in width are used to hold the plant. This paper may either be bought prepared or be gummed by covering it with mucilage, which is let dry and the paper then cut into strips as needed. The gummed paper is usually made as wide as the mounting sheet, as some collectors hold down the grasses and carices with long strips of gummed paper, rather than attempting to glue them. Many collectors, however, use only small strips of gummed paper only an inch or an inch and a half in length.

Each mounted sheet should be neatly labelled with a white paper label about 2x4 inches, and on it should be written the name of the species, the date of the collecting, the collector's name, the habitat and place where the plant was found growing, and the date. The label is glued to the sheet at the lower right hand corner, but only attached lightly at the outer end so that it can be readily removed if necessary. If labels are not used, the required data should be neatly written on the sheet. When collecting each specimen, it is important to write the name of the plant, if known, the place where it was collected and the date, on a piece of paper which is kept with the specimen until the regular label is written. It is not a good practice to trust to the memory, as after a season's collecting one cannot remember all the particulars. Plants of each genus are kept together in what is known as a genus cover, which is a folded sheet of strong paper, a little larger than the mounting sheets (12x16½ inches); and, for the outside of the genus covers, genus labels may be obtained on which is written the name of the order and genus to which the plants belong. The label is attached to the lower left hand corner.

The genera should be arranged in botanical sequence in a cabinet, which should be kept closed to prevent injury from dust and insects.

No herbarium is complete without a list of the specimens contained in it, and a check list of Canadian plants or of the plants of Ontario will be found of great use in marking the species which have been collecting and at a glance seeing those which are still to be procured. A check list of Canadian plants has been published by Mr. James M. Macoun, Ottawa, and of the plants of Ontario, by Mr. W. Scott, Normal School, Toronto.

PRACTICAL RFSULTS FROM THE STUDY OF PLANTS.

It may be asked, what practical benefit can be derived from the study of plants? This is a very pertinent question; for, in this age of keen competition it is as well, if possible to obtain something that will be of use to us in life, even from what may appear at first sight merely a delightful pastime. When Prof. John Macoun explored Manitoba and the North-West Territories in the seventies and travelled for hundreds of miles without seeing a white man nor a cultivated field, he was as certain that this great territory would eventually produce millions of bushels of wheat as it is now certain that they have been produced, and, when he was laughed at for his enthusiasm, he said "You will see that I am right." Why was he so certain? Because of his knowledge of plants. He knew what wild species of plants grew in sandy soil, loamy soil, clay soil and gravelly soil ; what kind would not thrive where the soil was alkaline and which kinds would. H

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was also able to tell whether the soil was wet or dry by the plants which grew upon it. He also knew what plants required a certain amount of heat to mature seeds. Thus he was able to draw his conclusions as to what proportion of the country would produce wheat and what would not. If a plant were found which took as long as wheat to mature, required as good soil to grow in, and as great heat to make it develop, it was quite safe to conclude that the soil and climate were suitable for wheat. This same knowledge of plants has been used more recently by Mr. Jas. M. Macoun in exploring the Peace River District. How great a service it would be to the farmer if he were familiar with the habits of plants and knew more of the commoner species! The knowledge would be of the greatest value to him in the purchase of land; for he would be able to tell at a glance whether a soil was poor or not, or whether it needed drainage. A knowledge of the root growth of weeds would make the eradication of them much easier for him; for he would better understand what system of culture was necessary. Few farmers know that every kind of weed has a seed which is quite distinct from every other kind. If he knew at sight the seeds of the worst weeds, it would be of the greatest possible service to him in helping him to keep his farm clear of them. While those practical applications of the study of plants are especially valuable to the farmer, they are useful to the market gardener and townsman as well; but there are other ways in which the latter may gain knowledge which will be useful to him. There are many species of fungi which are very useful as food; but the intense ignorance which prevails, makes them of comparatively little value except to a few. The study of fungi would soon lead to a knowledge of the edible kinds and to a larger consumption of this nutritious and wholesome food. To the amateur gardener the study of plants and their habits affords an inexhaustible field. He learns the time of blooming of the different species and varieties, the kinds which require wet soil and those that do not, the height to which each one grows; and he gets an endless amount of knowledge of plants which is of the greatest value to him in his gardening operations. There are many other practical applications which might be mentioned; but there is not room for them here and, in addition to all this, there remains the great fact that the more knowledge we have, the better is life worth living, and the knowledge which can be obtained in such a delightful manner as by studying plants and their habits, is sure to have no other than beneficial results.

A list of the books which are most useful in the study of plants, will be found in THE OTTAWA NATURALIST for May, 1904.

THE OTTAWA NATURALIST.

VOL. XVIII. OTTAWA, SEPTEMBER, 1904. No. 6

DESCRIPTION OF A NEW GENUS AND SPECIES OF RUGOSE CORALS FROM THE SILURIAN ROCKS OF MANITOBA.

By J. F. WHITEAVES.

APHYLLOSTYLUS, gen. nov.

Corallum consisting of slender, contiguous, subcylindrical corallites, that are circular or nearly circular in transverse section, and that seem to have formed part of a compound, branched, fasciculate, ascending and somewhat spreading colony, essentially as in *Pycnostylus*. Surface markings of the exterior of the corallites unknown.

The structure of the interior of the corallites consists of conspicuous transverse tabulæ, and of numerous, very minute, spiniform septa. The tabulæ, though irregular in their disposition and in their distances apart, are for the most part complete and continuous. The spiniform septa consist of both longitudinal and transverse rows of close-set, very short, straight and inwardly directed, minute spinules, not very unlike those of a Silurian Favosite, but much smaller and shorter. Where the tabulæ are comparatively far apart, the longitudinal arrangement of the rows of spinules is very obvious, and there are from four to seven spinules in each longitudinal row, between two of the tabulæ. But, in places where the tabulæ are close together, the transverse arrangement of the rows of spinules is more apparent, and there are either one or two transverse rows of spinules between two tabulæ.

The general shape of the corallites in this genus, their mode of growth and their internal tabulæ, appear to be essentially similar to those of *Pycnostylus*, but in the latter the septa are marginal, well developed, and consist of thin, continuous, longitudinal ridges.

Pycnostylus seems to be most nearly related to *Amplexus*, which is usually referred to the Zaphrentidæ, and it may be that *Aphyllostylus* should also be included in that family.

APHYLLOSTYLUS GRACILIS, sp. nov.

Corallites slender, averaging about two or three millimetres in diameter; septal spinules very minute, scarcely visible to the naked eye.

This genus and species are based upon fragments of colonies, n six small pieces of limestone of Silurian (Upper Silurian) age, rom Stonewall, about thirty-one miles west of East Selkirk, collected by Mr. J. B. Tyrrell in 1897. Each of these pieces of limestone shows both longitudinal and transverse sections of a few contiguous corallites, upon one or more of its recently broken surfaces. The internal structure of most of these corallites is well preserved, but their mode of branching is nowhere very clearly seen. Two or three similar specimens had previously been collected by the writer in 1888 from loose masses of limetone on the banks of the Fairford River, about six or seven miles below the Hudson Bay post at Fairford, Manitoba.

Ottawa, August 4th, 1904.

THE FLORA OF THE PEACE RIVER REGION.

By JAMES M. MACOUN.

There is perhaps no part of Canada in which a greater diversity of plants is to be found than in the Peace River region. Though the number of species is surprisingly small, yet plants characteristic of an arid climate may be found within a few miles of those requiring wet, almost boreal, conditions and a wonderful display of gorgeous prairie flowers may be seen within a few yards of the typical flora of the sub-arctic forest.

For the purposes of this short paper the words "Peace River Region" will refer only to the district drained by about one hundred miles of the Peace River, that is, the country north and south of that river between Peace River Landing and a point about forty miles above Dunvegan. In other words the region bounded on the south and north by Lat 55° and Lat. 57°, and on the east and west by Long. 117° and Long. 119°. This includes the whole of the area usually meant when the "Peace River Region" is spoken of. Westward from this district the country rises gradually to the Rocky Mountains, the Peace River taking its rise far to the northwest in British Columbia. From Peace River Landing the river flows northeasterly to Lake Athabasca, passing through what is known as the "Vermilion country."

The Peace River flows through the district under discussion in a deep valley, the bottom of which is from 700 to 1,000 feet, or even more below the plateau. The valley itself averages about three miles in width from rim to rim, the river flowing in sweeping bends from one side of the valley to the other cutting into the straight bank on one side while on the other a broad alluvial flat is formed, as is usual with all western rivers. The north bank of the valley is naturally warmer and drier than the south, as the full force of the sun strikes it, and this fact and the presence of a well-travelled trail on the north side accounts for the great difference between the two sides of the river. Repeated fires have almost wholly removed the forest, and the country between Peace River Landing and Dunvegan is almost all prairie, about 400,000 acres in all, while the south side is still clothed with forest. The extent of agricultural land in the valley is not great as the plateau is reached by a series of slopes and "benches," the level land at the bottom never reaching a mile in width and seldom half a mile. It is on these slopes with a southern aspect that plants characteristic of an arid climate are found, chief among them a cactus, (*Opuntia Missouriensis?*) which is quite common. The grasses are those of the driest parts of the southern prairie region,

The prairie on the plateau above would delight the eye of those who admire large masses of one color, for abundant as individual flowers are the number of species is strangely small. Hundreds of acres will be seen on which a single species predominates to such a degree that it colors the whole landscape. To the writer this seems conclusive proof of two things, the first being the comparatively recent origin of these prairies, and the second, that only a small number of the prairie plants of the south can withstand the climate of the Peace River region. The most natural explanation of the occurrence of these prairie species there is that many of the seeds were brought from the south, attached to the buffalo which formerly were very abundant, and the forest having been destroyed by repeated fires the conditions were more suitable to prairie species than those of the forest. Those which first made themselves at home soon spread and occupied large areas, making it more difficult from year to year for new species to establish themselves. On the other hand, the seeds of many species must have been been brought there, which if they germinated at all, were unsuited to the climate and soon disappeared. But whatever hypothesis be adopted to account for the prairie in the first place, or the introduction of suitable plants later on, the paucity of species is very evident. *Castilleia miniata* is perhaps the most conspicuous and the most abundant, and not being relished by cattle seriously interferes with the cutting of hay on the open prairie. Several species of leguminous plants are also common, the best of these for forage purposes being *Lathyrus ochroleucus*, *Vicia Americana* and *Hedysarum boreale*. The latter is among the most beautiful plants growing on the prairie, and to see masses covering many acres is a sight not soon forgotten by anyone. Though not usually a conspicuous plant, *Astragalus hypoglottis*, is on the Peace River prairies one of the most valuable forage plants, and it is not uncommon to see the ground covered with this species for hundreds of yards in every direction. No species rare in Canada were seen on the prairie, or indeed anywhere with the exception of *Caltha natans*, which abundant enough in that region in brooks and natural ditches, is very restricted in its range. The same might be said of *Adoxa Moschatellina*, usually found among moss around the roots of trees.

The flora of the woodlands is that of the sub-arctic forest though even here the number of species is not very large. Impinging as it does on the prairie the border of the poplar and spruce woods, shows a very curious mixture of prairie and forest species more noticeable here than further south, where the boundaries of the prairie are constantly changing, and in the poplar bluffs prairie species are often common. In the Peace River region, however, the prairie often ends suddenly at the edge of the virgin forest into which the characteristic prairie plants do not penetrate, while the plants of the forest of course, do not thrive on the open prairie, so that one may walk a few yards from the prairie to the forest or *vice versa* and find floras in which there is not a species common to both. It gives one a strange feeling to leave the bright prairie covered with masses of the most brilliantly colored flowers, and after walking for five minutes through the forest, to find oneself on the borders of a bleak moor, on which the vegetation is scanty, and willows and dwarf birches the only shrubs. In such places one may collect *Astragalus alpinus*, *Pedicularis Groenlandica* and *P. euphrasioides*, *Parnassia parviflora* and other species characteristic of cold, wet, poor soil. It is hard to believe when among such plants that a few hundred yards away the prairie is blazing with bloom, and only a mile or two further the bluffs along the river are covered with cactus.

As regards the rarity of the plants and the number of species the Peace River region is not an interesting one, but it affords a splendid field for the study of many interesting points in connection with the distribution of plants. The most important lesson taught is that whatever the climatic conditions or the character of the soil Nature may be depended upon to cover up the earth with verdure of some kind, if the forest is permanently removed plants peculiar to meadows or prairies will somehow or other make their appearance and when by means of drainage or other causes a wet area becomes dry plants suitable to the new conditions immediately appear. In the Peace River region a great variety of conditions exist in a very restricted area but even if the patch of alkali soil is only a few yards in extent or the dry hillside rises from among marshes and bogs the plants found are those characteristic of these conditions.

The trees found are those to be met with everywhere in the sub-arctic forest. The rivers are bordered by willows and balsam poplar (*Populus balsamifera*) while black spruce (*Picea nigra*) and tamarac (*Larix Americana*) grow in swamps and wet ground generally. The country as a whole is clothed with white spruce (*Picea alba*) and aspen (*Populus tremuloides*) and an occasional sandy ridge will be covered with Banksian pine, (*Pinus Banksiana*). There is almost no birch in the country except on or near the tops of the highest hills. None of the trees are large, 15 or 18 inches being the usual diameter for the largest spruces but though repeated fires have in many parts almost destroyed the forest there still remains an abundance of material for all the needs of the settler.

SOME BIRD-NOTES OF THE YEAR.

By G. EIFRIG.

A RED-LETTER DAY FOR WARBLERS.—The high-water mark in the spring migration of warblers was this year evidently reached on May 23rd. A perfect wave of warblers together with some thrushes, finches and wrens struck the city the night before this date. These lively and cheerful denizens of the tree-tops were very noticeable in the trees along our streets, in gardens and especially in those along the north side of the Rideau, where the bird army, coming from the low southern bank of the river would naturally strike first. In the afternoon of the above date, at three o'clock, I was in Lt.-Col. White's park, between Wurtemberg street and the Rideau. I have never seen so many birds and such a variety in so small a space before. In a spruce tree not over thirty feet high, I saw within about ten minutes, the following warblers: Blackpoll, Magnolia, parula, Blackburnin, bay-breasted, black-throated blue, black-throated green and the redstart, several of each, besides some more in the top which I did not recognize quickly enough. Mourning and the rare Tennessee warblers had also been seen in the morning, when the number of birds is said to have been still greater. Together with these warblers had come the white-throated and white-crowned sparrows, and the olive-backed thrush, which seem to prefer the company of warblers during migration. Added to all these the robins, bluebirds and blackbirds which had established their households in the garden long before this date, they certainly made it a very lively picturesque place for a while.

A HERONRY NEAR EGANVILLE.—On the 26th and 27th I had occasion to visit Lake Doré near Eganville, Renfrew County. At one end of this lake there is an extensive swamp area, partly made up of cat-tail growth, impenetrable alike to foot and boat and partly of wooded portions, where there is more firmness underneath. Several so-called spring creeks roll their muddy, dark colored and slowly gliding waters through these swamy woods. On the banks of one of these creeks, several rods from where it enters the lake, is the heronry. It consists of about 100—150 nests, which are from thirty to fifty feet up in the swamp elms, which in this place had at so late a date no leaves whatever. The nests are bulky affairs, made of large sticks in the crotches and forks of branches. They look very insecure and top-heavy, especially when their large proprietors get up on them to survey the surroundings. When our boat noiselessly glided up the creek, the nests could be seen from far, but no herons, but as we drew nearer one loud squeak would sound and then more and the herons would slowly and reluctantly fly out of their nests, some would merely stand up to see what was wrong. If a shot is fired or a paddle splashed flat into the water, the uproar is instantaneous and great. Later on, when the young are out and must be fed, the tumult and uproar especially at night is something awful. At this time most had their four large green eggs in the nest, yet some had one or two of the young out already. That the nests of these ungainly birds, so high up, are not very safe is attested by the number of young and broken eggs lying among the trees. The only species seen was the blue heron (*Ardea herodias*).

SOME MORE LAKE DORÉ BIRDS.—Out on the lake several loons

(*Gavia imber*) could at all times be seen swimming and diving when the boat would approach nearer than about a quarter of a mile. Their floating, nesting locations, right on the edge of the cat-tail areas, could be seen but no eggs as yet. The herring gull (*Larus argentatus*) could be seen drawing its graceful circles over the lake. It certainly is a fine bird, snowy white below and pearly gray above. It nests here also, laying its eggs on some of the large rocks near the shore of Lake Doré and Golden Lake.

Among the remnants of last year's cat-tails could be seen the curious little long-billed marsh wren (*Cistothorus palustris*). They were busily engaged building their nests. These nests are works of art and are also quite large for such tiny birds. Each pair builds several of these nests, which are globular, with a small entrance, well hidden. They are fastened to old cat-tail stalks, 2 and 3 feet over the water and all lined with the down from the old disintegrating cat-tails of the fall before. The nests are 5 to 6 in. in diameter outside, and are very compactly knitted or woven of old and new cat-tail leaves and grass. Why each pair builds several nests when only using one for their eggs, is not known, whether it is to mislead their enemies, or to have places of shelter in different parts of their swampy domain, or for other reason is hard to say.

BOTANICAL CLUB OF CANADA.

The last meeting of the Botanical Club of Canada was held in the City of St. John, N.B., on June 23rd, 24th and 25th, 1904, during the meetings of the Royal Society of Canada. There was a good attendance of members and a few visitors, among the latter being Prof. W. F. Ganong, who gave valuable suggestions.

The work of the Club was discussed and it was decided to take up some new lines of work, in addition to the valuable phenological observations which have been so ably edited by Dr. A. H. MacKay for several years. As a means of learning what botanical work has been done in Canada and that the Club might be of use in the advancement of the Science of Botany in the Dominion, it was further decided to ask each of the Local Secretaries living in various parts of Canada, to prepare each year a short report on work that has been done during the season in their respective districts, and before the next meeting (May, 1905) send this to the General Secretary, Dr. A. H. MacKay, Halifax, N.S., for incorporation in the annual report of the Club. In addition to the phenological observations it was thought that members of the Club might take up some other kind of definite co-operative work. The members present at the St. John meeting recommended that the special work for this season should be a careful examination of Volume I. of Macoun's Catalogue, and the preparation of a report on such extensions of range, or changes in geographical distribution of Canadian plants as had been discovered since the publication of the three parts forming Volume I. of Macoun's Catalogue of Plants (1883, 1884, 1886). It was agreed that it would be well if each local Secretary when reporting would make suggestions as to any other lines of investigation or special study which he thought would be useful in the development of Botanical science and suitable for the consideration of the Club.

It was further recommended that collections of the local floras of each province be made and kept in some central locality, such as the Normal Schools. The students of these schools during the term could be instructed and guided in the making of proper herbarium specimens of plants; and on their return to the various sections as teachers should be impressed with the advantage of working up the local flora of each section and making additions from these to the herbarium already started in the Normal School. Such collections would be advantageous from many points of view, but chiefly in the stimulus they would give to local botanists. If the grounds around each Normal School were sufficiently large, it would be a good idea to plant in them some native trees, shrubs, field flowers and ferns of the locality. These might well form an adjunct of school gardens, where established, and be an object lesson to show how well some of our native plants are adapted for ornamental purposes.

As the algæ (of our coast and inland waters), the fungi, lichens, mosses and ferns are scarcely known in comparison with our flowering plants, it would be well for students to turn their attention to these, especially as the best time for studying many forms such as lichens, fungi and algæ, is in the early autumn, when the interest in flowering plants has diminished.

OFFICERS OF THE BOTANICAL CLUB OF CANADA.

Elected on the 24th of June, 1904, at a meeting of the Royal Society of Canada in St. John, New Brunswick.

Honorary President :—John Macoun, M.A., F.L.S., Ottawa, Ontario.

President :—George U. Hay, D. Sc., St. John, New Brunswick.

General Secretary-Treasurer :—A. H. MacKay, LL D., Halifax, Nova Scotia.

SECRETARIES FOR THE PROVINCES.

Nova Scotia :—Principal E. J. Lay, Amherst.

New Brunswick :—James Vroom, Esq., St. Stephen.

Prince Edward Island :—John MacSwain, Esq., Charlottetown.

Quebec :—Rev. Robert Campbell, M.A., D.D., Montreal.

Ontario :—James Fletcher, LL.D., Ottawa.

Manitoba :—Rev. W. A. Burman, B.D., Winnipeg.

Assiniboia :—Thomas R. Donnelly, Esq., Pheasant Forks.

North-west Provinces and Territories generally :—T. N. Willing, Esq., Regina.

Alberta :—Percy B. Gregson, Esq., Blackfalds.

Saskatchewan :—Rev. C. W. Bryden, B.A., Willoughby.

British Columbia (mainland) :—J. K. Henry, B.A., High School, Vancouver.

Vancouver Island, B.C. :—A. J. Pineo, B.A., High School, Victoria.

J. F.

GIANT PUFFBALL —*Lycoperdon giganteum.*

Mr. A. H. Taylor, of the Customs Department, Ottawa, brought into my office this morning a fine example of the edible giant puff ball, Lycoperdon giganteum.

This specimen was obtained by Mr. Taylor on his property on Rideau street, Ottawa, where it had come up after the last rainstorm. It measures forty and a half inches in circumference one way and thirty-eight inches in the vertical diameter.

The colour is of an almost snow-white brilliancy and the surface for the most part smooth with shallow and inconspicuous wrinkles due to fissuring in the cortex or outer covering.

Two very large examples of this species were also observed last week on the Ottawa Golf Club links on the Aylmer road, the circumference of one according to the statement given me being fifty-nine inches.

The specimen presented by Mr. Taylor is now deposited in the Botanical Collection of the National Museum on Sussex street.

H. M. AMI.

Geological Survey Office,
Ottawa, Canada.

NATURE STUDY—No. XVII.

THE COLLECTION AND PRESERVATION OF BUTTERFLIES AND MOTHS.

By ARTHUR GIBSON, Division of Entomology, Central Experimental Farm,
Ottawa.

It does not require much experience to collect insects. Some kinds of these interesting creatures can be found at all seasons of the year. Of the Lepidoptera, the moths, which as a rule fly at night, are by far the most numerous, and the months of June, July and August are the best to hunt for them. The first butterflies emerge during the early warm days of spring and continue to appear throughout the summer, some species flying late into the fall. The following directions, owing to limited space, are brief but are included in this Nature Study series in the hope that they may be of use to teachers and students who may care to collect these insects in connection with their work. Insect life is full of intense interest, and in the study of these beautiful creatures many practical Nature Study lessons can be drawn.

THE NET.—Butterfly nets can be bought from any of the dealers in entomological supplies. These range in price from $1.00 to $2.50. It is not difficult to make a net, however, and this can be done easily at home. One of the nets the writer uses, consists of a piece of cane 38 inches long, and rather more than ¼ inch thick. This is bent in the shape of a circle (fig. 1), the sides of both ends being shaved off to fit the upper square projections of a ferrule. An easy way of carrying the cane when not in use is to put it under the coat around the waist, placing the ends in the side trouser pockets. A light stick from 2½ to 3 feet long answers as a handle. Any tinsmith for a small sum will make one of these ferrules (fig. 2). The one I generally use is made

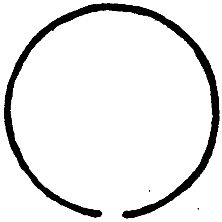

Fig. 1.

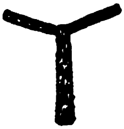

Fig. 2.

of tin, and has been in use for over eight years. For the bag of the net, ordinary green leno is serviceable. This should be first soaked in water to remove the stiffness. When dry again, it can be cut in shape similar to fig. 3, care being taken to see that it is well rounded at the bottom, so as to leave no corners. A piece of strong wide ribbon should be doubled and both edges sewed to the top, so as to make a passage for the cane to slide through to keep the net in shape.

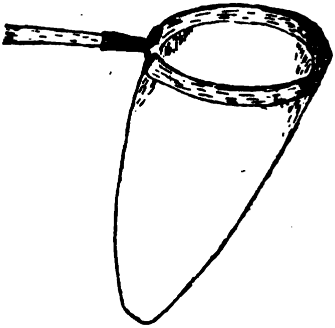

Fig. 3.

KILLING BOTTLE.—Any wide-mouthed bottle of convenient size will answer. The old 2 oz. quinine bottles, which may still be had from most druggists for a few cents each, do well for general purposes; the common vaseline bottle is also good. Test tubes can be had cheaply from druggists, and may be used for the smaller butterflies and moths. Cyanide of potassium is the poison used for killing insects. This should be broken into small pieces and put into the bottle. If a vaseline bottle is used, just sufficient should be put in to nearly cover the bottom. On top of this should be poured some liquid plaster of Paris, not more than half an inch. Some collectors put in a layer of sawdust between the cyanide and the plaster of Paris. The bottle should then be left standing for a couple of hours before replacing the cork. The deadly poisonous nature of cyanide of potassium should be kept in mind, and care should be taken in handling it. It is also well to label the bottle POISON. Large moths, such as the Emperors and Sphingids, are killed quickest by oxalic acid diluted in water. If with a sharp pen dipped into this liquid the underside of the thorax between the bases of the legs is pierced, some of the acid will find its way into the body and cause almost instant death. Preparatory to this a few drops of chloroform may be poured over the thorax ; this will stupefy the insect instantly, when it may be pierced with the pen dipped in oxalic acid ; the chloroform will soon evaporate and will not injure the specimen in the least.

COLLECTING.—With a little experience the collector will soon become expert in the use of the net. Of course, at first specimens will be missed and, even when caught, spoiled by careless handling; but practice will soon make perfect. It is impossible to lay down any rules as to where to collect. Butterflies do not all fly in the same places ; some kinds prefer sunny openings in woods, others swamps or the margins of streams, others again are found along railroad tracks, etc. The moths are to be sought for chiefly at night. Many begin to fly during the early evening and can be caught around flowers at that time. The electric lights on the outskirts of towns and cities attract great numbers, and here they can easily be collected. The method called "sugaring" is an interesting and productive way to secure specimens of many kinds of moths. The "sugar" is simply a mixture of molasses thinned with sour beer, which is smeared on the trunks of trees at dusk. These trees are then visited shortly afterwards and the moths there attracted collected. A dark lantern is of course necessary to enable one to find the trees which have been daubed and detect the moths upon them. When starting out, it is well to take some kind of a collecting box in which to pin specimens. An ordinary cigar box with a strip of cork glued to the bottom to receive the pins will answer. Special tin collecting boxes can be bought, but at first it is not necessary to buy these, nor in fact much other apparatus. Entomological pins, however, are a necessity, and these can be purchased in various sizes from the Entomological Society of Ontario, London, Ont.

MOUNTING —After having reached home the specimens should be mounted as soon as possible before they become dry. If they have dried, they may, however, be relaxed, by putting them in a receptacle containing some damp sand. An old vegetable dish does very well for this. For mounting butterflies and moths, spreading boards are used. These can be made by any one ; soft wood, such as whitewood, or pine, should be chosen. Fig. 4 shows a section of the style we use. As the bodies of Lepidoptera vary much, different sized spreading boards are necessary. Our boards are of two lengths 18 and 12 in. In width they are 6½, 4½, 3¼, 2 and 1½ in., with body spaces ⅝, ½, ¼, ⅛ and $\frac{1}{16}$ in. wide respectively. Below the groove a strip of cork should be glued to hold the pin which has been put through the central portion of the thorax of the insect. When mounted, the insect should be high up on the pin, about one fourth of the pin above the specimen. The wings of butterflies and moths should be arranged as shown in fig. 4, the lower margins of the front wings forming as nearly as possible a straight line. With fine needles the wings can be brought forward and held in place by strips of writing paper or thin cardboard. No. 00 insect pin cut in two and the blunt end forced nearly all the way into half a match, makes a splendid setting needle. These pins are very fine and when used carefully to pierce the wings to hold them in position, the holes made are so small that they are practically invisible afterwards. Specimens should be kept on the spreading board at least a week or ten days, and the boards may be hung in rows on a wall, if a hook of some kind is screwed into the top of each.

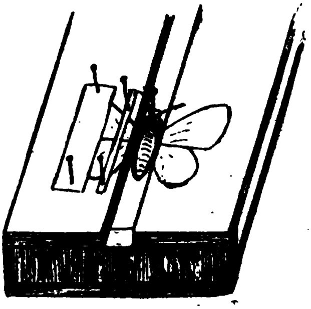

Fig. 4.

If it is not convenient to mount the specimens immediately after their capture, these can be put in envelopes and then stored away in a tin box until the opportunity arrives when they can be relaxed and spread. Fig. 5 shows the pattern of envelope used by entomologists for papering their captures.

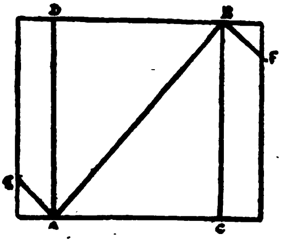

Fig. 5.
Method of folding paper for envelope. First fold on the line A B, then on A D and CB, and then on B F and E A.

These can, of course, be made in any size. The date, locality, and name of collector should always be plainly written on each envelope.

PRESERVING SPECIMENS.—When the specimen is removed from the spreading board, a neat label, bearing the locality, date of capture and name of collector should be put on each pin. Scientifically, a specimen is regarded as useless if it has not this information. If only a small collection is being made, mounted specimens may be arranged in ordinary cigar boxes, or any other kind of shallow box ; but it will be necessary to keep examining these constantly, as they are not, as a rule, tight fitting, and museum pests soon find their way into them and destroy the specimens. Insect cases may be bought from dealers and, if only a few are needed, probably would be cheaper in the end. These are of various sizes, and are lined with sheet or pressed cork, to receive the pins. The Schmitt case is recommended by many and is used extensively in the United States. If it is the intention to form a large collection of butterflies and moths, of course, it would be better to have a cabinet made, containing a dozen, or more, drawers, all similar in size and pattern. Most collectors like to have a series of at least four specimens of one kind of butterfly or moth. This is not always possible, as many are too rare ; but of the available species it is advisable to have two specimens of each sex, and also a specimen mounted so as to show the underside. Some form of deterrent to museum pests, as naphthaline or camphor, should be put in each case or box. A simple way is to make small bags of cheesecloth and fill these with ordinary flake naphthaline, pinning one in a corner of each box. If at any time fine dust is noticed under a pinned specimen, it is evidence that some pest is at work. In such cases a spoonful of bisulphide of carbon, or benzine, should be poured into the box, then the top closed quickly and left unopened for some hours.

A pair of entomological forceps will be found very useful in handling pinned specimens.

EARLY STAGES.—From a teacher's standpoint, collecting the immature forms and keeping them under observation until maturity will prove a most helpful way of arousing interest in insect life. In the fall of the year cocoons of the Emperor Moths are often seen attached to the limbs of trees. If these are gathered and kept out of doors during the winter, and brought into the school in the early spring, the scholars will be interested in watching for the appearance of the moths. The cocoons of the Promethea Emperor Moth are usually to be found each fall on the lilac. Caterpillars of many kinds can be collected all through the season and with, a little care, reared to maturity. An easy way to obtain larvæ is to beat the foliage of trees and shrubs over an inverted umbrella. The greatest pleasure in entomology is the study of the life-histories and habits of species. The field is wide, and there is still a vast amount of work to be accomplished. The most useful work can be done in studying the early stages of moths. Only a small percentage of these have been thoroughly worked out, and careful observations recorded are of much importance. Specimens of the mature forms collected in the field, in many cases, are more or less rubbed or damaged, and always inferior to bred material. For few larvæ, ordinary jelly jars with tin lids will answer. Some earth should be put in the bottom of each jar, as many caterpillars pupate in the ground. Fresh food should be fed every day and care taken to keep the jars clean. If a number of the same caterpillars are being reared, larger jars will be necessary.

If at all possible, at least one specimen of each kind should be preserved for future reference and study. This is best done by inflation, and specimens thus prepared are more valuable than those put in liquids. Proper apparatus may be purchased from dealers in entomological supplies, such as : an oven, in which to dry the empty skins while being inflated ; a spirit lamp to furnish heat ; some glass tubes drawn out to different sizes at one end ; some clips made of watch spring and held to the glass tubes by means of a band cut from rubber tubing ; a double rubber bulb with about three feet of tubing attached ; and a pair of fine curved forceps. The process, briefly, is to (1) kill the caterpillar in a cyanide bottle ; (2) place it on a piece of blotting paper, cover it with a strip of the same paper, and gently press out, through the anal orifice, using the pair of fine forceps, all the body contents ; (3) attach the anal segment to one of the glass tubes, fastening it with one or two of the spring clips ; (4) connect the glass tube to the tubing of the double bulb and inflate the larval skin by gently squeezing the outside bulb, at the same, with the other hand, hold the caterpillar in the oven to dry. When perfectly dry, the larva should be carefully removed from the glass tube and mounted with shellac on fine wire, one end of which should be first wound several times around an insect pin. Naturally, at first specimens will be spoiled, but with care good results will soon be obtained. It is best to begin with hairless larvæ.

THE OTTAWA NATURALIST.

VOL. XVIII. OTTAWA, OCTOBER, 1904. No. 7

THE BRITISH ASSOCIATION PRESIDENT'S ADDRESS, 1904.

By Prof. E. E. Prince, Dominion Commissioner of Fisheries, Ottawa.

No doubt many readers of THE OTTAWA NATURALIST will be interested to read a more adequate, if somewhat condensed, account of the remarkable address by the British Premier at Cambridge, England, last August, than the fragmentary references to it in our Canadian press. Hence the following notes have been prepared.

When that distinguished body of scientists, the British Association, met this year in England's famous seat of learning, Cambridge, it was appropriate that one of her most distinguished sons should be chosen President. The choice was unique, in that the *savant* chosen was also the Prime Minister of England. The name of Balfour is one held in special honor at Cambridge, for a younger brother of the Right Honorable Arthur Balfour was, until his tragic death in the Alps, the most brilliant biologist, excepting Darwin, that the ancient university has given to the world. The chair of Comparative Embryology, held by the late Professor Francis M. Balfour, has never been filled since his death. The reason, it has been said, is that no worthy successor has been forthcoming.

Premier Arthur Balfour has no mean reputation as a thinker and *littérateur*. The students of Scotland's oldest University (St. Andrews) elected him Lord Rector in 1886, and his rectorial address was a remarkable one in the field of literary criticism. Later, as Rector of Glasgow University, and at the present time, as Chancellor of the youngest of Scotland's Universities, viz : Edinburgh, Mr. Balfour has worthily sustained the distinction of his family name. His masterly treatises "Philosophic Doubt," "The Foundations of Belief," and other works, have given him eminence as a speculative philosopher. The late Principal John Caird, of Glasgow, once said, in my hearing, "It is easy to be a great philosopher in the company of scientists, and easy to be a great scientific man amongst philosophers; but Mr. Balfour is a great philosopher among philosophers, and a scientist among scientists." Of Mr. Balfour's real interest in science I have personal knowledge, and I well remember when I had the honor of first meeting him, that I was startled by his familiarity with a line of special zoological research in which I was at the time engaged, fifteen or sixteen years ago.

Cambridge which boasted a Newton, a Couch-Adams, and a Darwin in the past, and can claim to-day a Kelvin, and a Rayleigh and other leading scientists, was privileged to listen to a profound and closely-reasoned address on the Aim and Basis of Scientific Investigation from the President of the British Association, the membership of which Association this year exceeds 2,500.

The precise title chosen by Mr. Balfour was "Reflections suggested by the New Theory of Matter," and after pointing out that physical reality, not mere appearances or changing phenomena, formed the object of the highest scientific research, the President rapidly reviewed the ideas about matter which have prevailed since Newton's epoch-making "Principia" (published in 1687).

OLD CONCEPTION OF MATTER.

In the 17th century the average scientist regarded the universe as composed of ponderable matter, various in kind, permanent and indestructible: but capable of transformation by heat, chemical affinity, &c. Interstellar space in the vast heavens was conceived to be occupied by a thin, continuous kind of matter called ether, whose undulatory motions resulted in light, radiant heat, and electricity. Young's wave theory of light, a hundred years ago, led to the abandonment of such theories as Newton's light corpuscles or the emission by luminous bodies of material molecules which produced the sensation of light in the brain.

RECENT IDEAS OF MATTER.

In 1904 (a century later) the modern ideas as to the atomic and molecular composition of matter, the kinetic theory of gases, the laws of the conservation and dissipation of energy, so potent in 19th century science, have been surpassed by the latest affirmation that gross matter is, after all, a mere appearance, whose physical basis is electricity.

ELECTRICAL MONADS.

The chemist's ultimate atoms, whose groupings constitute the molecules of the chemical elements are now regarded as themselves groups of sub-atoms or monads. These are not electrified particles of matter; but are electricity itself. The different elements of the chemist are really different arrangements and motions of monads. "Thus" said Mr. Balfour, "two centuries ago electricity seemed but a scientific toy. It is by many declared to-day to constitute the reality, of which matter is but the sensible expression."

QUALITIES OF MATTER.

Formerly matter was said to have primary, essential qualities, such as shape and mass, which existed independent of any observer. It had also secondary qualities, like warmth and colour, which had no existence excepting as effects upon the organs of sense-perception in living beings. Mass is now pronounced to be no longer an attribute or a quality, but a relation. Far from being necessary and unchangeable, as was formerly thought, mass changes with every change in velocity, and especially at high rates of velocity. Professor Rutherford states that these corpuseles have a velocity in some cases 40,000 times greater than a rifle bullet which travels at the rate of about ½ a mile per second. (*Harper's Mag.*, Jan., 1904)

FEEBLEST FORMS OF FORCE CHIEFLY APPARENT.

Chemical affinity, molecular cohesion and the like, hitherto so important in the eyes of the physicist, are mere residual effects, the feebler manifestations of force as compared with the intense electrical forces which keep the atom in being. Gravitation, Newton's imposing discovery, is trifling compared with the attractions and repulsions of electrically charged bodies, while these, again, are insignificant as compared with the internal attractions and repulsions of the electric monads. Each atom of matter is the theatre of energetic forces, however inert may be its external relations.

UNITY THE AIM OF SCIENCE.

"Will this bold attempt to unify physical nature last?" asked Mr. Balfour. A world built-up out of sixty or seventy eternally different chemical elements is just as rational a conception as if it were constructed out of a single medium: but men of science have always been impatient of multiplicity. Reduction of plurality to unity is a scientific instinct not to be ignored.

EXPERIENCE UNTRUSTWORTHY AS A SCIENTIFIC BASIS.

The President then considered the basis of experience upon which scientific research founds its laborious investigations. Scientists formerly held that to go behind experience was impossible, yet Faraday's disbelief in that *dictum* led to the modern electrical theory of matter. Gravity itself, says the physicist today, must be explained, it is no longer held to be an ultimate property of matter admitting of no explanation and requiring none. Matter itself, in masses or in minute particles, molar or molecular, is resolved by recent science into that which is not matter at all. The minute particle, called the atom, is a relatively vast theatre in which the sub-atoms or electrical monads perform their evolutions. The minuteness of these monads may be judged from Prof. J. J. Thomson's statement that radium throws off, as cathode rays, streams of these corpuscles, each of which has a mass of about one-thousandth part of the hydrogen atom and thus they are the smallest bodies known to science. (See *Harper's Mag.*, l. c. p. 279).

SCIENCE CONTRASTS WITH COMMON EXPERIENCE.

Matter, as viewed by scientists, could hardly be more divergent then it is from prevailing ideas or common experience, yet all science must inevitably be based upon experience, which is really but another name for the perceptions of the bodily senses.

EXPERIENCE WHOLLY ILLUSORY.

Starting from experience, scientific thought yields conclusions which prove experience to be misleading. "Our knowledge of reality" Mr. Balfour pointed out, "is thus based upon illusion, and the very conceptions by which we describe it to others or think of it ourselves are abstracted from anthropomorphic fancies, which science forbids us to believe and nature compels us to employ."

INDUCTIVE THEORY INADEQUATE.

The school of John Stuart Mill held that the task of science ended if the sequences of our individual sensations were accounted for. Mill's "Logic" dealt with succession and co-existence in phenomena, with methods of agreement and difference, with the laws of nature as observed uniformities and nothing more. The inner character of physical reality was of no concern to science. This "thin intellectual fare" as the President styled it, is what was served out under the imposing title of Inductive Theory.

IF BODY AND MIND ARE EVOLVED WHAT FOLLOWS?

Our organs of sense (eyes, ears, touch, &c.,) inform us that there is a physical world: but science says the constitution of our organs, our eyes, our ears, &c., whose reports are really sense-perceptions, has reached its present condition by evolution or natural selection So also have our intellectual powers. Utility has decided everything; what is fittest alone survives. Man's physiological and mental outfit, adapted to the highest scientific inquiries, are due to blind forces, which have no prevision of loftier uses. The rudimentary instincts of the animal have thus been perfected into powers of analysis and calculation enabling man to mete out the heavens or divide the atom. The imperfection of man's ordinary beliefs and ideas, based upon illusory experience, may be due to these circumstances and to this genesis. Too accurate and direct a vision of physical reality might have been a disadvantage in the struggle for existence. Falsehood being, perhaps, more useful than truth, and living tissues (composing the organs of sense) being such imperfect material, no better results could be attained. This applies to the senses: but it must also apply with equal force to the intellectual powers.

SCIENCE GIVES NO COHERENT INTERPRETATION.

If evolution thus provides man with untrustworthy instruments for obtaining knowledge, or rather sensations, the raw material of experience; why should it succeed better in regard to reason, whose task is to turn experience to higher account.

Evidently something is wrong with the purely scientific explanation of the acquisition of truth and reality. As Mr. Balfour declared, there is "a certain inevitable incoherence in any general scheme of thought which is built out of materials provided by natural science alone." Knowledge, which science regards as the final outcome of irrational (animal) conditions, must be pronounced essentially rational, or science itself disappears.

As the speaker claimed, in an eloquent passage :—

"Extend the boundaries of knowledge as you may ; draw how you will the picture of the universe ; reduce its infinite variety to the modes of a single space-filling ether ; retrace its history to the birth of existing atoms ; show how under the pressure of gravitation they became concentrated into nebulæ, into suns, and all the host of heaven ; how at least in one small planet, they combined to form organic compounds ; how organic compounds became living things ; how living things, developing along many different lines, gave birth at last to one superior race ; how from this race arose, after many ages, a learned handful, who looked round on the world which thus blindly brought them into being, and judged it, and knew it for what it was—perform, I say, all this, and, though you may indeed have attained to science, in nowise will you have attained to a self-sufficing system of beliefs."

Thus, the more complete seems to be our explanation of what we know, the more difficult it is to discover by what ultimate criteria we claim to know it. The President concluded by confessing that the dilemma was not one for physical science to remove, for here the confines of a territory were touched where philosophy claims jurisdiction.

If the senses and instincts of the lower animals are inadequate to yield a true conception of the universe in which we find ourselves, and if these, more refined and highly developed in man, are still unreliable and misleading in the ordinary human mind at any rate, and furnish, under the name of "experience" or "common sense," grossly erroneous conclusions as to the realities of existence, the resulting paradox is strange indeed. The latest product of human evolution, the scientific intellect, in its highest and most daring flights, is compelled to rely more and more, not upon actual common experience, but upon idealistic interpretations of the universe. Such interpretations transcend the crude reports of sense-perception : but they mould the results of experience and sense-perception into harmony with ideas, preconceived and necessary and full of light and satisfying meaning.

DISCOVERY OF THE EGGS OF SOLITARY SANDPIPER.

By WALTER RAINE, Toronto.

At last the long-sought for eggs of the solitary sandpiper have been found and it affords me much pleasure to be the first ornithologist to have the opportunity of recording its nesting habits, which are unique amongst North American birds, for I have positive proof that this species lays its eggs in the nests of other birds; this being one of the most important discoveries in recent years in regard to the nidification of any American bird.

In "Nests and Eggs of British Birds Non-Indigenous," Mr. Chas. Dixon says of this species:—

"Incredible as it may seem the nest and eggs still remain unknown to science, for it is impossible to accept the description of the latter given by the late Dr. Brewer without authentication. There can be little doubt that this species lays its eggs in the discarded nests of other birds in low trees like its old world representative the green sandpiper is known to do, search should be made in such places in the summer haunts of the species."

I am aware that other ornithologists have previously recorded what were supposed to be eggs of the solitary sandpiper, but most of these records were simply conjecture and very unsatisfactory. The egg recorded by Dr. Brewer, according to the description that he gives, was doubtless that of the piping plover, the nest being found on the ground, and it will now be seen the solitary sandpiper does not make its nest on the ground.

Another supposed nest of this species was recorded by Dr. Clark of Kingston, Ont., in "The Auk" for Oct., 1898. This same nest was also recorded in THE OTTAWA NATURALIST for December, 1899, by the Rev. J. C. Young, but this nest was found on the ground and the parent was not secured. Mr. C. A. Reed in his work "North American Birds Eggs," figures one of these eggs found by Dr. Clark and it resembles a variety of the spotted sandpiper. The eggs of the solitary sandpiper are larger and more pear shaped than any spotted sandpiper egg I have seen, and the texture of the shell is very different to that of the spotted sandpiper, being a fine grain and polished; then the ground color is pale greenish white, a tint never seen in a spotted sandpiper egg.

The genuine eggs of the solitary sandpiper are entirely different from spotted sandpiper eggs, in fact there is no American sandpiper egg that has the slightest resemblance to that of the solitary sandpiper. They bear a family likeness to eggs of the European green and wood sandpipers as might be expected, but of course like the birds themselves, the eggs are smaller than those two species of European sandpiper.

Now for my records which are absolutely authentic and thoroughly conclusive and establish once for all the fact that the solitary sandpiper does not lay its eggs on the ground, but deposits them in the nests of other birds often at considerable distance from the ground.

In the spring of 1903, I engaged Mr. Evan Thomson, to collect birds eggs for me in northern Alberta, and when the season was over he sent me notes on the specimens he had collected, amongst which was a record of finding a clutch of sandpiper eggs in an old American robin's nest built in a tree top.

I felt sure these would turn out to be eggs of the solitary sandpiper, and in due time the eggs were sent down and I saw at a glance, the eggs were new to me, but as they very much resembled a set of green sandpiper eggs in my collection, except being smaller in size, I was sure I had at last secured a genuine clutch of solitary sandpiper eggs. Several ornithologists who called to see my collection of birds eggs confirmed my opinion that this was a genuine set of this species. Amongst those who saw them, I may name the Rev. C. J. Young, Madoc, Ont.; Mr. Ed. Arnold, Battle Creck, Mich.; and Mr. Ed. Reinecke of Buffalo, N.Y.; but I thought I would wait for another year in the hope that Mr. Thompson would find another clutch and secure the bird, and in this he was very successful; as the following letter shows :—

"This season on June 9th, I found another set of solitary sandpiper eggs, this time in a grackle's nest in a low tree. I blew the eggs and left them until the next day, intending to return with my gun and shoot the bird, but on again visiting the nest, I found the eggs had gone, evidently the bird had removed them as I saw no trace of egg shells around. However, on the 20th June, I was still more fortunate, as I found another clutch and shot the parent bird as she flew from the nest and secured the four fresh eggs

This time the eggs were found in a cedar waxwing's nest in a spruce tree out in a swamp or muskeg."

The following is a description of these nests of solitary sandpiper eggs.

SET I.—Taken in northern Alberta, June 16th, 1903. 4 eggs advanced in incubation, collector, Evan Thomson. This set was found in an old nest of the American robin, built 15 feet up in a tamarac tree, that was growing in the middle of a large muskeg, dotted with tamaracs, the bird was flushed off the nest but unfortunately not secured. The eggs are exceedingly handsome and very different from the eggs of any other American sandpiper. The ground color is pale greenish white, heavily blotched and spotted, chiefly at the larger ends with vandyke brown, chestnut brown and purplish grey, the average size of these 4 eggs is 1.36 x 98, and they are very large for the size of the bird.

Set II.—Northern Alberta, June 9th, 1904. 4 eggs found in the nest of a bronzed grackle, built in a low tree; these eggs were unfortunately lost owing to Mr. Thompson first blowing them and then leaving the shells in the nest until he returned with his gun to secure the parent bird, but on his return on the following day, no trace of the eggs were to be found, the bird evidently had carried them away.

Set III.—Northern Alberta, June 24th, 1904. 4 eggs found in the nest of a cedar waxwing, which was built in a small spruce tree growing in a swamp, the nest being about 5 feet from the water, and Mr. Thompson was fortunate in shooting the parent bird as she flew from the nest, and thus identification is very complete and established the fact once for all, that the solitary sandpiper does not lay its eggs in a nest on the ground like other sandpipers, but takes possession of the nest of other birds, built in trees, just the same as its old world representative the green sandpiper is known to do.

The ground color of this clutch is also pale greenish white and the eggs are spotted with purpled brown, vandyke brown and purplish grey, and average in size, 1.36 x 99, thus it will be seen they average larger than eggs of the spotted sandpiper which measure about 1.34 x 90. Both clutches with the skin of the parent solitary sandpiper together with the nests are now in my collection for the inspection of ornithologists. The finding of the eggs of the solitary sandpiper now makes the seventh species whose eggs were unknown to science until discovered by myself and assistant collectors in northern Canada. The other species whose eggs were previously unknown are Richardson's merlin, greater yellowlegs, belted piping plover, Nelson's, Leconte's and Harris's sparrows. The four latter species we found nesting in Manitoba, while the eggs of Richardson's merlin and the greater yellowlegs were discovered in Alberta.

OBSERVATIONS ON SOME OF OUR RARE BIRDS MET WITH IN 1904.

By Rev. C. J. YOUNG, Madoc, Ont.

In an earlier number of the OTTAWA NATURALIST, I recorded the appearance of the evening grosbeak in the neighborhood of Kingston in the months of February and March; also of the appearance of the horned lark at its usual time in spite of the bitterness of the winter. I will now refer to a few birds I met with this past season.

The goshawk is a not uncommon winter visitor to Ontario; it breeds occasionally, and is one of the earliest of our hawks to do so I have previously recorded a nest found near Perth in 1885. On the second of May, it contained three eggs, incubation commenced. On the 22nd April, in the present year, a nest was located in the township of Oso, while snow was still deep in the bush, and the ice on our lakes was strong enough for a person to cross; at that date the nest contained three fresh eggs, unspotted and of a decided bluish tint. Both of these nests were located in beech trees about 45 feet from the ground, as also was one observed in the township of Elzevir, which in June contained two well grown young ones.

The red-shouldered-hawk breeds regularly in N. Frontenac, but the further one goes north, the rarer this bird becomes. It is also an early breeder, laying in the latter part of April, and selecting any suitable tree, very often a maple, sometimes an ash, oak, beech, elm, pine or hemlock, in all of which trees I have seen the nest.

The red-tailed-hawk is quite rare in eastern Ontario, I have no knowledge of its nesting along the St. Lawrence though I have seen the bird. In the rougher parts of the country northward a few pairs do so, and this year a nest was located in the township of Olden, in a high black ash, which on May 21st contained two eggs, highly incubated.

The vicinity of Sharbot Lake is the summer home of many warblers, and some of the fly-catchers. Of the latter I have observed the king bird, the great-crested, the olive-sided, the wood peewee, the phoebe, Traill's fly-catcher (Var. alnorum), and the least fly-catcher. Of the former, the yellow warbler, the myrtle warbler, the magnolia warbler, the black-throated green, the black-throated blue, the blackburnian, the palm warbler, the Maryland yellow-throat, the oven bird, the water thrush, the Canadian warbler, and the red-start, along with two or three varieties, that I could not identify, are frequent. All the above breed, and during the past season, I saw nests of magnolia, June 6th, in a small black spruce, containing four young ones just hatched ; on the same date a black-throated-blue warbler's in a maple sapling, with two fresh eggs ; also a red-start's with four eggs ; and on May 27th, a water-thrush's just ready for eggs. But none of these birds is rare compared with the olive-sided fly-catcher, which I located on the 6th June, in the same black spruce swamp, where I found the magnolia warbler. In the open spaces, patches of arctis huckle-berry grow round the scattered spruces, and amid the springy moss, were the largest pitcher-plants then in flower, I had ever seen. A short distance away, outside a belt of spruces were many plants of the beautiful lady's slipper, *Cypripedium acaule ;* and not far off the bright waters of Sharbot Lake. In a black spruce eighteen feet high, the olive-sided fly-catcher had established his home. The nest was built on a horizontal bough thirteen feet from the ground, and on June 6th, contained two eggs. Later, in the swamp on June 23rd, I found another of these nests containing three eggs, incubation commenced. It probably belonged to the same pair of birds, as it was not more than fifty yards from the first nest, but was built in a much larger black spruce, on a horizontal bough, twenty-five feet from the ground. I had never seen this bird in its breeding habitat before, or had even met with it On the above occasion, while walking through the little swamp, my attention was attracted by its loud and singular call or alarm note. It would sit on the topmost dead branches of the trees and rapidly repeat three times syllables, which one writer compared to 'quirk,' 'quirk,' but which I thought more resembled three creaks of a rusty door hinge. The bird is very restless in the vicinity of its nest, continually on the move ; the nest itself is built of small, dry tamarac and spruce twigs, interwoven and lined with tree lichen and moss.

I might mention several other birds as met with in this locality, but space forbids, so I must leave them for the present ; I will only refer to the solitary sandpiper. I wrote a short paper on this bird, which appeared in the OTTAWA NATURALIST, of December, 1899. There I stated my observations on the bird up to that date (1899) and concluded with an account of a nest and three eggs found by me near a creek on Amherst Island, the identification of which I considered at the time absolutely indisputable. The nest was on a sandy knoll, near a creek ; the flight of the bird was peculiar, but what I most of all relied on, were the evident whitish features of the tail.

Subsequent developments however, lead me to suppose that my identification was faulty, for Mr. W. Raine of Toronto, received from Alberta, two sets of eggs, taken from the disused nests of other birds built in trees, which if his correspondent is correct, certainly belong to this species. I have seen one of these sets of eggs and am impressed with their resemblance to eggs of the greenshank, green and wood sandpipers of Europe, but of course they are smaller, as they should be. It should be remembered that Mr. Charles Dixon, the writer of 'non-indigenous British birds,' in writing of this species some years ago, said "there can be little doubt that this species lays its eggs in the deserted nests of other birds in low trees, like its old-world representative, the green sandpiper, is known to do." Dr. Brewer's record and my own with regard to these eggs are unsatisfactory.

As a supplement to my former paper, I may add I did not meet with the solitary sandpiper after 1899, until May 22nd, 1903, when

I saw a bird at a small lake in the township of Olden. This year 1904, I saw an unmistakable bird in immature plumage, with down still adhering, rise from a pool by the road-side in dense woods in the township of Kennebec, on 6th July. But as proof of their breeding in this part of Ontario, I will relate my experience this summer near Madoc, in the county of Hastings. I was driving past a road-side pool near a swampy meadow on 24th August, when several sandpipers rose, and alighted on the neighboring fence. I stopped the horse and watched them. They were a brood, four young with the two old ones: were very tame; they would fly down to the muddy pool, then alight on the fence again, would sometimes perch on a stump on the dead branch of a neighboring tree. I could get within eight or ten feet. I thought a photograph would be interesting, so I came another day, but could never get more than two on the fence together. I obtained photographs to that extent, after visiting the location on several afternoons. The last time I saw any of them was the 16th September. This brood was doubtless hatched in the vicinity, and having been undisturbed, will probably locate themselves there another year, if they survive the migration. I have heard from boys, whom I met near by, of a snipe's nest having been found last spring in an apple tree, and was assured by them that the bird flew out, and until they saw this nest they always thought the snipe made its nest on the ground. This had reference to the solitary sandpiper.

But not much dependence can be placed on such a statement, and until I see the nest, and examine any fragments of egg shell there may be in it, I only mention the statement for what it is worth.

Madoc, September, 1904.

THE CANADA JAY.

(By WM. H. MOORE. Scotch Lake, N.B.)

The Canada jay (*Perisoreus canadensis*) is one of our Canadian birds which is blessed with several local names. Some of these names are "camp-robber," "whiskey-jack," "moose-bird," and "gorbie," but speak of this bird as Canada jay to most of his human acquaintances and they know not what bird is meant.

The Canada jay is one of our most hardy birds. So hardy in fact, that not only do the adults withstand our severe winters, but they even build their nests and bring forth the young while snow still covers the ground. The nest is a compact affair, built of twigs, fine shreds of bark, and hair, and if wool is obtainable it is added.

The plumage of the young, is much darker than that of the adults, being sooty black throughout with a slight tip of white on tail feathers. The white of the head and neck is lacking until August or September, when they have assumed the same colored dress as the older birds, being greyish with white cheeks, throat and collar, forehead, and tip of the tail. When on the wing they seem to float on the air, rather than to be working vigorously with the wings as some birds do. A cause of prejudice against the Canada jay is the manner in which at times they obtain their food. They are much disliked by trappers and hunters, as they often take the bait from traps set for fur-bearing animals, and also by feeding upon carcases of game hung up by hunters. Many hunters have lost shots at game on account of this bird giving a a cry of alarm when it sees a man, and as all of the wild neighbors partially understand the calls and actions of their friends, all know to be on the *qui vive* when an alarm call is given. Campers also dislike its way of taking any bit of food that it can carry away, yet some campers delight in feeding the birds just to see them eat, and carry away what they cannot eat. Anything from a small bone, bread-crust, or piece of soap is acceptable to their needs ; whatever it may be, it is picked up in the bill, and while on the wing it is changed to a foot, and changed as easily as you or I could change a like article from one hand to the other. But all do not live all the time by camp robbing, or trap-robbing. If they did many of the names applied to them would be well earned.

Let us see the Canada jay from an economic, a beneficial point of view. This will bring to light other habits and a different food supply. Small mammals, killed by the birds themselves, are part of the bill of fare, and insects in all stages of life form a large part of the menu even among camp fed birds.

The writer performed a surgical operation upon a Canada jay which had been in the habit of dining with a crew of lumbermen, and was much surprised to find that nearly one thousand eggs of the Lorset tent-caterpillar had been taken for breakfast. The chrysalids of this caterpillar are also fed upon, and in the autumn while the birds are migrating south they feed largely upon locusts, beetles, etc. The young taken in June feed upon beetles and caterpillars, species well known to the birds but unknown to the writer.

What real naturalists our wild birds are, knowing how, when and where to find and obtain their food supply, be it insect in any of its stages, plant forms, or other life. Were we able to understand our wild neighbors what a great amount of information could be gained regarding the life histories of many forms of life.

A most interesting entertainment to witness is when the Canada jay turns his attention to collecting mice. Not only is it interesting to witness but from appearances the performances is highly interesting to both jay and mouse. A Canada jay was heard shrieking and calling in such a manner as to call the attention of man. A mouse had been running over the snow from one burrow to another when it was espied by the sharp eye of the jay, who immediately gave battle by flying down and catching the mouse in its bill, whereupon the mammal turned upon its foe and prepared to defend itself by trying to bite the bird, but the jay seemed aware of such tactics and suddenly dropped its prey. The mouse sprinted for cover, but was again held up. These tactics were followed until the mouse had become too badly injured to run, when it was most viciously seized and pecked to death. With screams of victory the jay made his way to a stump where the mouse was added to various other products of Nature in the internals of Perisoreus. To sum up both sides of the case, for and against the Canada jay, I for one think we should put down the verdict thus : Canada jay highly beneficial from the habit of feeding upon insects and mammals injurious to the welfare of man.

There are three sub-species of the Canada jay, viz : (*Perisoreus canadensis nigricapillus*) having a blackish crown. Inhabiting the the coast region of Labrador north to Ungava Bay. (*P. c. fumifrons*,) in which the white of forehead is smoky colored, inhabiting Alaska.

(*P. c. capitalis.*) The white species, especially about the head, larger than *canadensis*. Rocky mountain region of U. S.

BIRD NOTES.

RUFFED GROUSE.

Dr. Fletcher's note in the December, 1903, number, reminds me of a similar incident which occurred some years ago at Beacon Hill park here, during the progress of a cricket match. One of these birds was flushed by a dog on the opposite side of the park and came flying over the field where it was terrified by the shouting and yelling of the crowd. It made straight for the nearest cover, where the Park Hotel stood, flying at a great velocity. The hotel door stood open and just opposite was a large mirror, the poor bird went through the door and against the mirror, falling dead on the floor.

J. R. ANDERSON.

Victoria, B.C., 4th January, 1904.

BIRD MIGRATION.

Mr. E. A. Wright of Ottawa, noted on the morning of October 9th, at 3.35 a.m., a migration of many thousand birds which from their note he took to be some species of plover. They continued to pass over for about an hour, when he fell asleep. Mr. Wright noted that the birds seemed to be flying very low, and from the difference in their note it was evident that some of them rested for a short time.

J. M. M.

NATURE STUDY—No. XVIII.

THE PRESCRIBED COURSE IN NATURE STUDY FOR PUBLIC SCHOOLS.

S. B. SINCLAIR, Ph. D.

The Easter meetings of the Ontario Educational Association held in Toronto, have for several years been devoted almost entirely to the consideration of new courses of study for Public and High Schools.

As a result of this investigation the regulations regarding the subject matter of study in these schools have been greatly changed. One of the most radical of the reforms made is the introduction of Nature Study into every grade of the Public School. The December number of the NATURALIST for 1903 contains an outline of the course which was proposed. As a number of alterations were made before adoption it has been thought better to give the following copy of the revised courses, which are now compulsory in the first four classes of the Public School.

Form I.

NATURE STUDY.—Animal life : General appearance and habits of pet animals, their care and food ; domestic animals on the farm, their care, habits and uses ; birds, their nesting, song, food, migrations in the autumn ; metamorphosis of a few conspicuous butterflies or moths.

Plant life : Work in school garden or in window boxes ; study of a plant, as a geranium or pansy, from slip or seed to flower ; caring for plants in pots ; buds, their preparation for winter, their development ; autumn leaves, collections, forms, tints ; economic fruits, collection, forms how stored for winter, fruit as seed holders, dissemination of seeds ; roots and stems, uses, comparison of fleshy forms, how stored for winter.

Life on the Farm : Harvesting, primitive and modern methods compared ; preparation for winter ; the barn and its uses ; activities of the farm during winter ; winter sports and social life on the farm ; the varied operations of spring time ; spring time as awakening to new life ; effects of sun and moisture on the soil.

Form II.

NATURE STUDY.—Course of Form I. continued. Animal life: Life history and habits of domestic animals and of a familiar wild animals, as the squirrel, chipmunk, robin, crow; earth-worm, habits, structure, uses; toad, habits, structure, uses; observation of live insects and their activities, comparison of young and adult stages.

Plant Life: Co-operative and individual work in school garden; cultivation of plants in pots with observation of the development of leaves and flowers, parts of leaves and flowers; change of flower to fruit and of fruit to seed; functions of the parts of flowers; the forms and uses of trees; activities connected with forestry and lumbering, with study of pioneer life and present conditions on the prairie.

Observation of farm, garden, and household operations.

Form III.

NATURE STUDY.—Course of Form II. continued.

Animal Life: Adaptation of different kinds of Animals to their respective habits and surroundings; birds, life history of types, habits of wild fowl in different seasons; fish, forms and uses of different parts of the body, food and how obtained; life histories of moths, butterflies, beetles and grass-hoppers; useful insects, as ladybird and dragon fly; harmful insects; Nature's insecticides.

Plant Life: Germination of seeds under controllable conditions and in the school garden and window boxes; opening of buds; study of the forms and functions of the parts of plants, and comparison of these forms and functions in different plants; observation of the culture of farm and garden crops and of orchard and shade trees; the observing and the distinguishing of the common forest trees.

Different kinds of soil, as sand, gravel, loam, leaf-mould and clay; experiments to ascertain how soils are composed, whether of mineral or of decayed organic material, and which best retains water. Additional phenomena of spring in the vicinity of the school, cause of snow melting, ice floating, etc.; how nature prepares the soil for growth of plants. Distinction between hard and soft, pure and impure water; tests and methods of impure water; tests and methods of purification of water.

Sources of heat: Experiments to show the effects of heat in the expansion of solids, liquids, and gases; practical applications. Temperature; thermometer, construction and graduation Methods of transmission of heat, conduction, convection, and radiation; causes of winds and ocean currents; ventilation.

Form IV.

NATURE STUDY.—Course of Form III. continued Animal life; relation of fish, birds, and wild animals to man; life histories of conspicuous and economic insects; organs and functions.

Plant life; study of organs of plants and their functions; study of economic and wild plants from seed to fruit in the school garden, home garden, farm and forest; weeds injurious to crops and methods of destroying them; buds and twigs: wood, rings, grain, and bark, uses, etc.

Observing local minerals and rocks, their properties and uses; experiments to show composition of soils and their relation to drainage, temperature, etc.; varieties of soils adapted to different crops; fertilizers, etc. Implements and tools used on the farm and in the household, mechanical principles applied in their construction.

The atmosphere; its composition; combustion, simple experiments, study of candle flame products; changes produced in the air by respiration; reciprocal relation of plants and animals as regards the atmosphere; impurities in air.

Gravity; air and liquid pressure, the barometer. Cohesion and adhesion, the nature of these forces; phenomenon of solution and diffusion; amorphous and crystalline forms of matter. Practical use of heat, steam, and electricity, in connection with the study of industries.

Form V.

ELEMENTARY SCIENCE.—An elementary course in Botany, Zoology, and Physics.

For the details of the course, see Appendix B., p. 82 of printed Regulations of the Education Department of the Province of Ontario.

NOTE 1.—The objects of the course are to train pupils in correct observation and deduction; to give, in connection with the instruction in Geography, a fair knowledge of the world around them to those who will remain at school only a year or so; and to lay the foundation for the more detailed study of each subject in the case of those who will continue the work. The spirit of the Nature Study of the lower form should be retained, but the teacher should introduce a more systematic treatment of the subject with organization of the material in Botany and Zoology as will lead to simple classification. The course should be correlated with Geography, Drawing and Composition.

NOTE 2.—Under each of the sub-heads in Appendix B, full details are given of the courses. The order of the topic, however, is merely a suggested one. In Botany and Zoology, the extent and the character of the details of each topic are left to the principal and the teacher, and should be determined by the accessibility of the material and other local considerations. The course in these subjects should be practical throughout. Each pupil should possess a good lens and be taught how to use it. Approved methods of collecting and preserving botanical specimens and of keeping live animals suitable for study should be systematically followed. An herbarium and a museum of local specimens should be provided where practicable. The pupils should be encouraged to provide specimens from the locality. Much of the practical work, especially the observations, will necessarily be done out of doors by the pupils alone, under the direction of the teacher, or by the pupils, conducted by the teacher. The course in Physics shall be experimental as far as possible, and the pupils should be encouraged to work at home and to prepare simple apparatus. The amount of the apparatus required is at the discretion of the Public School Inspector.

NOTE 3.—Books for reference and for supplementary reading should be provided in the school library. Systematic written descriptions and drawing should be required throughout the course, and the exercises should be dated and presented for comparison and inspection, the work being systematically supervised by the teacher. In none of the science subjects shall notes be dictated by the teacher.

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SUMMER WARBLERS IN COMPTON COUNTY, QUEBEC.

By LEWIS M. TERRILL, Montreal, P.Q.

The district in which the following observations were made comprises an area of about five miles in the vicinity of Bury, Quebec, a village in Compton County on the C.P.R. almost equidistant from Sherbrooke and Megantic.

Lumbering has only recently become extensive and the forests are still large, with coniferous trees predominant. The country is hilly and well watered, forming an ideal summer home for many warblers and other birds of a retiring disposition.

BLACK-THROATED GREEN WARBLER.—My notes on this species are based on three nests and if others should be found to continue in a relative similarity, a description of one would suffice. The first, found June 1st, 1902, was fastened, one foot from tip, on to limb of a small shrubby spruce, three feet from the trunk and six from the ground. The spot chosen was a side hill covered with a growth of young spruce and cedar. The nest, well hidden by an overhanging branch held four fresh eggs and was composed exteriorally of dead spruce twigs neatly interwoven with yellow birch bark shreds and lined with fine grasses and animal hair. Its inside diameter measured 1¾, outside 3 inches; inside depth, 1¾, outside 2⅓ inches. The well rounded and finished appearance and the predominance of birch bark reminded me of certain vireos' nests. Two nests found later, on June 9th and 29th, were similarly situated and constructed and contained respectively four fresh and one addled egg. The eggs measure uniformly .66 x 49 are white distinctly and obscurely dotted, chiefly at the larger end, with varying shades of rufous brown and lilac and a few distinct spots of black.

BLACK AND WHITE WARBLER.—June 5th, 1902. I saw a pair which evidently had a nest near by. Not otherwise observed during the breeding season though common about the 10th of May.

BLACKBURNIAN WARBLER.—July 12th, 1902. I saw a pair in an open spot of spruce woods, caused by surveyors felling several trees whilst staking out a line. They were much disturbed by my presence and probably had young.

CANADIAN WARBLER.—I saw a pair June 5th, 1902, and noticed others at different times through summer months.

NASHVILLE WARBLER.—June 12th, 1902. As I emerged from spruce thicket into an alder grown portion of a blueberry swamp, I noticed one of this species fly from a mossy knoll and after considerable searching found the nest deeply embedded in the yielding side of the mound. It was a slight affair (the surrounding mosses rendering a more substantial structure unnecessary) of withered grasses, moss and rootlets, containing four young a few days old. I saw several others during the breeding season principally amongst the undergrowth in boggy places.

MAGNOLIA WARBLER.—One of the most common warblers in this district, breeding in localities similar to those that the black-throated green and myrtle frequent. A nest found June 5th, 1902, was fastened, six feet from the ground and four from the trunk, on to a well foliaged limb of a small shrubby spruce, situated on the outskirts of a hilly spruce-grown pasture land, almost surrounded with deep woods. The female was on the nest, which was composed of very fine blackened grasses loosely fastened with spiders' silk and lined with horsehairs, appearing very fragile and transparent, somewhat similar to nests of the chipping sparrow. It was well concealed by an overhanging branch and measured inside depth 1⅓, outside 1¾ inches; inside diameter 2, outside 3¼ inches. The eggs, four in number, averaging .63 x .48 and quite fresh, were washed on the larger ends with a pale shade of cinnamon brown encircled with a wreath of spots of rusty brown and lilac in varying shades, on a creamy white ground. On June 16th another nest 2½ feet from the ground resting on twigs of a small cedar brush, the topmost foliage partially concealing it, was composed of fine grasses, black rootlets and spruce twigs, loosely bound with spiders' silk and lined with horsehair. Locality, a dense growth of small spruce, cedar, tamarac and alders, gradually merging into a large forest. This nest also held four fresh eggs, creamy white, encircled on the larger ends with a wreath of brownish purple markings, and averaging 66 x .49.

Other nests show that the eggs vary considerably more, in the coloring, than do those of the black-throated green warbler, one nest containing eggs finely dotted over the entire surface with light grayish brown. In this locality the Magnolia warbler commences building about the first of June and four eggs, I found invariably, to be the complement. Two nests noticed on the 15th and 20th of June contained young newly hatched.

MYRTLE WARBLER.—This species appeared to be more abundant than any of those previously mentioned, excepting, perhaps, the Magnolia. They commence nest-building about the latter part of May, about one week earlier than the Magnolia. Their nests are very substantial and warmly built, one found June 3rd, 1902, with five eggs incubation 1-5th, was composed chiefly of dead spruce twigs with a few grasses and rootlets, bound with spiders' silk and thickly lined with feathers and animal hair. It was four feet from the ground, built close to the trunk of a young slender spruce with scanty foliage, situated in a spruce grown pasture skirting the swamp. The dimensions of this nest were, inside diameter 2, outside 4 inches ; inside depth 1½, outside 2¼ inches.

Eight out of ten nests discovered were placed a few feet from the ground near the top of slender spruces, the characteristic material used being a predominance of spruce twigs with a lining of feathers. Five eggs, less commonly four, composed a set and it would be vain to attempt a description as they show great variation, though in one instance, when I was enabled to examine two sets laid by one female, consecutively on June 10th and 24th, the markings were similar, though curiously enough the second nest held five and the first but four eggs. The nest found on June 10th was disturbed, hence the second laying as this species, in common with other warblers, normally breeds, as far as I am aware, but once a year. Measurements also differ considerably, the largest found being .76 x .58 and the smallest .64 x .51, the largest being nearer the average. This warbler is one of the last of the family to leave for the south, large flocks remaining until October 20th. I saw a few feeding in an orchard in the village as late as October 24th.

CHESTNUT-SIDED WARBLER.—Arrives here during the second week of May and many remain to breed. Its nest is usually a slight affair of grasses and vegetable fibres placed in the crotch of some small shrub or sapling amongst deciduous second growth. A nest found June 7th was very compactly built for this species. It contained four fresh eggs and was placed in a triple crotch of a basswood sapling amongst undergrowth in a well timbered locality. It was two feet from the ground and composed of shreds of yellow birch bark. Coarse bleached grasses, well woven and bound with a large quantity of spiders' silk, ornamented with numerous basswood bud coverings and with fine rootlets and horsehair.

This bird showed great foresight in placing the nest, as it was completely hidden by a large basswood leaf, though a week previous, during development of nest and leaves, the nest was in plain view. In the several nests I examined in this district the number of eggs deposited was invariably four. The uniformity, with regard to the number of eggs in a set, of the several warblers enumerated, may perhaps be partially ascribed to the absence of that parasite the cowbird, which appears not very partial to newly settled districts notwithstanding an abundance of cows. I did not find any warblers' nests containing eggs of the cowbird, in fact the only individual intruded on was a bluebird, and in this instance the would-be cowbird did not mature as the egg, with three of the bluebirds, was frozen during the severe frosts of May 9-10th, 1902.

The American redstart and Maryland yellow-throat were fairly common, though not nearly so abundant as in Montreal.

The yellow warbler, one of the most common summer residents in Montreal, was notable by its absence, as I did not see a single specimen either as summer resident or migrant.

One nest of the ovenbird was found July 1st, 1902, not arched though built higher on the side furthest in the hollow of the mound in which it was located, containing four eggs. I found this species fairly common in damp woods, and their song was very noticeable at night from 9 to 11 o'clock, during the breeding season.

UNUSUAL NESTING SITES OF THE AMERICAN MERGANSER (*Merganser americanus.*)

By WALTER RAINE, Toronto.

In all works on North American birds, nests and eggs the nesting situation of this species is given as being in a hole in a tree, after the manner of the hooded merganser, buffle-head, American golden-eye and wood duck. I was therefore very much surprised to find American mergansers nesting in holes under boulders on an island in Lake Winnipegosis, Manitoba, during June, 1903.

My son and I found about 30 pairs nesting on Gun Island on June 16th. All the nests that we could reach were built far back at the end of dark passages under boulders on the highest part of the island, some nests being from four to six feet back from the entrance and were hard to get at; in some cases my boy had to crawl between the boulders to reach the eggs and I had to pull him out by the feet. In one hole he caught a female on the nest, and afterwards my boy tied a fishing line to its leg and let it swim around the boat. It was astonishing with what speed it cut through the water using its wings and fairly flying under water, after which we gave it its liberty and it flew away. The nests contained from 8 to 12 eggs, one nest containing as many as 13. They are easily distinguished from other duck eggs by their very large size and pale buff tint, averaging 2.60 x 1.80. One nest contained eggs laid by two females as half the eggs were of a deeper tint and different size and shape than the others. The down is pale greyish-white after the fashion of all other ducks that nest in holes in trees or in the dark. The male mergansers flew away as our sail boat approached the island, but the females sat close dashing past our feet as we scrambled amongst the boulders where they were nesting. On this same island several red-breasted mergansers had nests containing 8 and 9 eggs each; their nests were not at the end of burrows, but in depressions under dense undergrowth. The eggs are smaller than those of the American merganser and of a darker tint, being yellowish-drab or warm drab; average size 2.50 x 1.70. The down is also darker and of a warm greyish tint. Both ducks are very destructive to fish and are therefore disliked by the fishermen. They are known to gunners as sawbills, and their flesh is rank and unpalatable.

ORNITHOLOGICAL NOTES.

During the past season I investigated an unusual nesting site of our common black duck (*Anas obscura*). This well known and extensively distributed species usually builds its nest on the ground, but last June I visited an island in the St. Lawrence where a pair had taken possession of a last year's crow's nest and successfully brought off their brood. The nest, which was built after the usual style of crow architecture, was saddled on a limb of a hugh elm, forty feet from the ground, and was reached after a difficult climb with climbing irons. A liberal supply of down had been furnished by the duck and incubation was well advanced. Just how frequently such nesting sites are resorted to by these ducks it is difficult to say; had the bird not been accidentally observed flying to the tree her presence would never have been suspected. I photographed the nest containing the ten eggs, but owing to the extremely awkward position in which I had to make the exposure only eight are shown. The duck sat very close and did not leave the nest until I was within a few feet of it.

THE BLACK GUILLEMOT (*Cephus grylle*).—June 10th last, while walking along the harbor front, I saw a black guillemot swimming rapidly toward the open lake. I believe this is the first instance of this species having been observed in this locality. Speaking of this bird in 1885 the late Mr. McIlwraith, in "Birds of Ontario," says one was shot in Hamilton Bay many years ago, and according to the Catalogue of Canadian Birds one was taken at Toronto in 1885. These seem to complete our records for Ontario. While at the Magdalen Islands last year I saw many flocks; they are swift flyers and expert divers. Unfortunately, a large percentage of the guillemots that occasionally stray as far west as Lake Ontario die of starvation, so often the common fate of sea birds that wander so far from their natural habitat.

E. BEAUPRÉ.

Kingston, Oct., 1904.

AN OCTOBER TRAMP.

Lured by the glamour of a recent morn, which presaged a bright invigorating day, I started at eight o'clock for a tramp to Kirk's Ferry, where the charming scenery of the Gatineau river and the Laurentian hills is admirably exhibited. This very diversified and picturesque district holds many attractions for the naturalist and nature-lover. Through its broken ridges and swamps, the deer are still not uncommon, especially in the neighbourhood of the beautiful lakes which lie a few miles to the westward (Meach, Harrington and Phillips). From these retreats they sometimes stray, or are driven, even nearer to the city, as it was my good fortune to observe on this tramp. When half-way up the long hill (which gives pause to many a cyclist) opposite Wright's Bridge, I heard the yelping of dogs coming up from the deep wooded ravine through which the Old Chelsea brook flows down to the Gatineau. Halting for a moment, I was greatly surprised to see a doe and fawn go bounding by on the other side of the ditch, their white tails flashing among the roadside weeds and brambles. They did not seem to see me, but disturbed by a wagon a few rods ahead they separated, the doe going off toward the river and the fawn turning to the left down through the gullies. The noise made by the dogs upon their trail showed that the pursuers were not hounds, and when they came in view, toiling heavily along, they proved to be a spotted coach-dog and an old collie. They went off upon the trail of the fawn, but I was glad to think that they could hardly overtake even this poor little creature. Surprised to witness a chase within less than five miles of the Parliament Buildings, my wonder was augmented upon gaining the plateau at the top of the next hill (at the pine grove where such a good view offers of the Chelsea rapids) to see another doe coming down through the field, as if to cross the road toward the river. It was running almost straight for a wagon full of hunters from Hull, but startled by their stopping and jumping down to get their guns out of the wagon, it turned and ran down inside the fence toward me. My sympathies being with the harassed and timid animal, I crouched down by the fence, and when it came by at arm's length I jumped up and waved my coat, to frighten it back into the woods. It ran to the end of the field and then crossed the road and went down over the hill side. Two of the gunners came up and asked me where it had gone but I merely said that it had crossed the road, upon which they went down through the thick scrub some distance from where the deer went in, and having no dogs I knew there was little fear of them finding the quarry. Near Chelsea, in the cone-laden pines, squirrels were feasting upon the seeds, which they deftly extracted from the long cones held upright like tapers before them. The road here winds through a rich piece of woods, offering a welcome shade to the way-farer in midsummer. Unfortunately the axe of the woodman has already made considerable ravages among the maples, beech and oaks. Some ledges of rock, faced with various mosses and lichens and crested with a luxuriant growth of polypody, suggested that a new locality might be found for the dainty walking-fern. My quest extended some distance from the road, but in vain. A large hawk was working among and over the trees beyond and apparently made a kill, as it settled on a limb and evidently tore its prey to pieces. The bird was so hidden by intervening trees that the species could not be made out, but it appeared to be dark above and very pale beneath. The squirrels here were feasting on the fallen beech nuts, and bluejays with brilliant plumage and ugly voices fluttered from place to place. There were numerous juncos and occasional sparrows creeping about among the fallen leaves, but the bluebirds, so abundant a fortnight before had evidently departed. A partridge next flew up from the roadside and sailed off with a noisy whirr of wings, and while I strolled on slowly looking carefully around for any others, I saw standing in a little glade about thirty yards from the roadside a fine large doe, much larger than those previously seen. It was standing broadside to me in full view, the trees being scattered and leafless, and was calmly contemplating me. After looking at it for some minutes I decided to frighten it back into the bush as I knew if the hunters came along and saw it in such an exposed position its health might suffer. Waving my arms did not disturb it and it viewed the waving of a coat with no more sign of alarm. When I started to go nearer through the rustling leaves it soon cocked up its tail and bounded back over the ridge to temporary safety. Kirk's Ferry was reached without further incident, and the Gatineau was seen to be unusually high. The hills along the river had lost nearly all the bright colours that clothed their sides so brilliantly two weeks before, for winds and rains had left few leaves upon the trees. After dinner I returned by the back road through Old Chelsea, and down past the old iron mines. Several gunners were seen and shots heard in the hills but no game appeared. Three examples of the Canada jay were noted; one near Kirk's Ferry, one on the road to Old Chelsea, and one about a mile nearer town than that hamlet I can recommend to our naturalists such a twenty-five mile ramble as pleasant, profitable and health-giving.

W. H. H.

BOTANICAL BRANCH.

The first meeting of the Botanical Branch since the early summer was held at the residence of Mr. W. T. Macoun, on the evening of Nov. 4th. The members present were Messrs. Fletcher, John Macoun, Whyte, Clarke, J. M. Macoun, St. Jacques, Edward Cameron, Roy Cameron, Attwood and Campbell. Mr. Willing of Regina and Mr. W. H. Harrington were present as guests.

The subject chosen for discussion by the chairman was "Individuality in Plants," and in order to introduce it he read extracts from an address delivered by Prof. Hugo de Vries at the Convocation of the University of Chicago, Sept. 2nd, 1904. Prof. De Vries holds that new species of plants originate from accidental forms or sports rather than as described by Darwin in his theory of evolution. In his address, Prof. De Vries gives an account of his observations on Lamarck's evening primrose, a close ally of the common evening primrose. He observed that while the type persisted, sports presenting specific characters were frequent, and in the discussion which followed the reading of these extracts Mr. W. T. Macoun mentioned that he had seen some of these new species in New York. Some of the members present thought Prof. De Vries' selection of a plant to observe unfortunate as the *Œnothera biennis* group have very long been known to exhibit a wide range of variation in individual plants. It was decided to secure further information on this subject and discuss it at a future meeting.

Dr. Fletcher told of the efforts that were being made in Argenteuil Co. to prevent the further encroachment of drifting sand on cultivated lands there, and exhibited branches of Canadian balsam which had thrown out roots when the sand reached them. These roots would not only serve to add to the food supply of the tree but in the event of its being killed young trees would grow from them. *Spiræa salicifolia*, which grows in the depressions among the sand was mentioned by Dr. Fletcher as being an evidence that the "drifting sand" is dry only on the surface.

Mr. W. T. Macoun exhibited specimens of apetalous apple blossoms. About a dozen flowers were received by him, May 26th, in clusters averaging three flowers each. The calyx was very similar to that of ordinary apple blossoms but the petals were abortive, very small and hidden by the sepals. The flowers were evidently all pistillate. There were 15 stigmas on each flower.

BIRD MIGRATION.—With reference to the note on Bird Migration which appears on page 144 of THE OTTAWA NATURALIST for October, I can fully confirm Mr. Wright's observation as to the immense flocks of evidently small birds passing over the city on the morning of 9th Oct. Sleeping in an upper room with my window wide open I was awakened by their notes and listened to them for a long time. While they were passing I heard the clock in the Parliament Buildings strike three. About an hour later I again heard them for some time. My scanty knowledge of bird-notes did not enable me to recognize the species.—W. H. H.

REVIEWS.

CONTRIBUTIONS TO CANADIAN PALÆONTOLOGY, Vol. III.—ON DRYPTOSAURUS INCRASSATUS (Cope), FROM THE EDMONTON SERIES OF THE NORTH-WEST TERRITORY. Part III., July, 1904. By Lawrence M. Lambe.

The continuation of the Reports on vertebrate palæontology of the Geological Survey of Canada is most welcome. Following Part I. by Professor Cope on the mammals of the Cypress Hills Oligocene beds, and Part II. by Professor Osborn and Mr. Lambe, chiefly on the reptiles of the Belly River series, Alberta, comes the interesting memoir of Mr. Lawrence M. Lambe on the large carnivorous Dinosaur of the Upper Cretaceous, Edmonton or Laramie beds. In the meantime Mr. Lambe has received the well earned title of Vertebrate Palæontologist.

The two skulls described here were found many years ago in the Edmonton series of Alberta, and were identified and described by Professor Cope as specifically identical with *Lælaps incrassatus* which had been found in the somewhat older Judith River beds of Montana. Professor Cope published a brief description without figures, and as we knew little of the cranial characters of the Upper Cretaceous Dinosaurs, Mr. Lambe's full description and figures are of very great interest and value.

As restored by him the skull in proportions is remarkably similar to that of the small Tuatera lizard of New Zealand enlarged to a massive and formidable scale, that is, the facial region is less elongated than in the carnivorous Jurassic Dinosaurs, which seem to be closely related if not ancestral to this Upper Cretaceous form. What is lost in length, however, is gained in strength and power, proof that the Upper Cretaceous carnivorous Dinosaurs were thoroughly capable of attacking the huge horned Dinosaurs (the Ceratopsia) of the same period. These particular specimens are of a somewhat smaller and lighter construction in the feet than others which have been found farther south, and there is evidence of considerable specific if not generic variation among these animals in adaptation to the capture of the many different forms of herbivorous Dinosaurs which existed at the same period. In his description of the jaw Mr. Lambe figures the presplenial. Professor Williston considers that this is simply an anterior expansion of the splenial.

HENRY F. OSBORN.

MONOGRAPHIE DE L'ILE D'ANTICOSTI. By Joseph Schmitt. Paris. 1904. pp. 367.

From whatever standpoint it may be considered, Dr. Schmitt's monograph must be considered one of the best works of its kind published anywhere, and nothing approaching it in completeness has ever been published on any part of Canada. Whatever one may think of such a large part of our country as Anticosti being owned by a single individual, one cannot but feel grateful to M. Menier for having made the publication of such a work possible. Paper and type are excellent and scattered through the book are many illustrations, charts and maps which in themselves would serve to give one a very good idea of the physical features of the island. Dr. Schmitt's long residence in Anticosti and the large collections he has made in all branches of natural history, enabled him to discriminate between what were trustworthy and what were doubtful among the published records, and that these were all consulted is evidenced by the very complete bibliography which concludes the volume.

The first part of the monograph is devoted to the geography and history of the island, and the account of its discovery and settlement is given in considerable detail. Under the heading "Meteorologie" the climatic conditions are considered, and Dr. Schmitt's conclusions are based on careful and complete observations extending over several years. The sections devoted to palæontology, botany, ornithology and entomology contain lists of all the species known to occur on the island, with localities and collectors' names, and in all branches of natural history notes on distribution and other information is contributed by the author himself.

J. M. M.

NATURE STUDY—No. XIX.

NATURE STUDY AND THE CAMERA.

By FRANK T. SHUTT, M.A.

As we understand the term, popularly, to-day, Nature Study is primarily and essentially the study of the out-of-doors. Therein lies its great fascination and charm. It takes us out into the sunshine and fresh air—and that is wherein it differs from our ordinary scholastic work. Away—body and mind—for the time from bricks and mortar and books and desks to learn what we can of the form and life and habits of plants and animals, to consider the meaning of the rocks and the soil, the clouds and the rain, but what is of far higher value, to realize as we have never done before the beauty of form, of motion and of color in the things about us—that, in part, is the essence of Nature Study and what it helps us to do. Forest and field, river and stream, the earth and the sky, all may be made to contribute towards this knowledge and all looked at aright may help us in the recognition of the beautiful and thus add much to the enjoyment of life. Our eyes and our mind are opened to the beauty of the things about us. There is created or developed within us a new sense—the realization of the beauty that lies in form and color.

Now, it is evident that the first step in Nature Study is to correctly observe. This is by no means such an easy matter as many may suppose. It is a rare art, though a fascinating one. It not only requires time—one might say, leisure—and concentration of thought, but also practice. To a certain degree it is a gift, born in us, *i.e.*, that we differ, naturally, in our ability to see clearly and accurately and take note of the things about us, but like all gifts it must be developed and trained before it can reach its highest attainment. Moreover, it is an art that can be acquired even by those who by nature are in a large measure unobservant—and we believe that to such, especially, is this study one of great value. How many of us go through life without making a clear mental concept even of the trees and plants passed and repassed almost every day, so much so, indeed, that some have never recorded (mentally) the difference in contour between an elm and a maple !

But Nature Study does not stop at careful observation and the formation of distinct and true mental pictures. It leads to a knowledge not only of the structure but of the functions of living things. It continually puts the questions, why? and wherefore? and thus educates or draws out that valuable art of deduction, without which our observations would be of little service—without which half the value of Nature Study would be lost. Of this feature, however, it is not our present intention to speak further, but rather to bring to the notice of the earnest and enthusiastic student the camera as an aid and adjunct to careful, accurate observation. The making of a photograph—and by the making I include the taking, the dark room work and the printing—serves to impress the image of what we have seen upon the mind and memory as nothing but making a drawing can—emphatically and accurately. The mere focussing on the ground glass of the tree, a clump of fern, the bird on her nest, serves to imprint the image on the memory more accurately, vividly and permanently than does the casual glance at the objects themselves. How much deeper and more lasting is the image after the finished print is made! The writer found in his college days that it well repaid to write out his lecture notes, even though the manuscript might never be reviewed—and in later days he finds the same principle still holds good with Nature Study and the camera.

All this, valuable as it is, however, does not comprise all the benefits to be derived from the aid of the camera. Though Nature Study is, as we have said, primarily for the out-of-doors, it frequently calls for subsequent work indoors to a more complete understanding of the objects of our study. In the photograph, carefully made, we have a record for this purpose. We cannot bring home with us the clump of towering trees, but in the image so accurately made by light we can again and again consider and compare their mode of growth, their contour and many other features. The same truth is still more obvious in geological studies. The rock cuttings showing the various strata, the escarpments and boulders can only be brought home for future study by the camera. And what shall we say of the fugitive clouds that, unconsciously to most of us, make the beauty of the landscape? We must secure the image ere the substance goes, and that quickly or we shall be without an aid to our imagination for enjoying again the pleasures of the cloud-flecked sky. And as the highest enjoyment is only obtainable when accompanied by knowledge, we may add there is much to be learned from cloud formation and cloud forms, from the utilitarian as well as from the æsthetic standpoint.

Again, we can live again and enjoy the pleasures of our summer studies and rambles in our photographic records, and thus obliterate in part the severity and the monotony of our long winter. Not that the study of nature must necessarily cease in that cold and snowy season. There are a thousand objects still to interest and instruct us in the forest and by the stream, even when the white mantle lies deep upon the ground. One could easily enlarge upon this phase of Nature Study—one that has as yet received but little attention.

All knowledge is relative, or practically so. We learn by making comparisons. What more necessary for this than the possession of records? Of some objects, by their very nature, we can only obtain their image and for this photography is particularly helpful—indeed indispensable. That this fact is now widely recognized we have only to note the wealth of photographic illustrations in all works now published on the Natural sciences.

But perhaps enough has now been said to awaken an interest in the erstwhile photographer, who years ago may have bought a kodak, pushed the button and let somebody else do the rest. That camera, perhaps, was long ago relegated to the garret. Unfortunately, the cheapness of the instrument and the ease with which a part of the picture making could be done has served, with many, to make the camera little better than a toy and its manipulation the merest pastime. Naturally with them the camera has gone the way of the crokinole board and table tennis—it was amusing for a time, but soon became tiresome and was put aside. No, the camera must be used seriously, if it is to be with us a life work and a life pleasure, and it is very much to be doubted if any subject or study can afford so much of interest and value and pleasure as the study of Nature in her manifold manifestations.

And, in conclusion, it may be useful to give a word or two of practical advice to those who having some skill in photography may desire to use that skill in the study of Nature. To be successful, both from the standpoint of making records by the camera and of making real progress in our study, do not attempt at first to work in many fields. Select one or two subjects, and, as far as possible, exhaust them before taking up another. An odd fact or picture gained here and there from many subjects, may in time make a collection of some interest and occasional value, but not to be compared in either interest or value to a systematized knowledge and a complete record of one or two subjects. Concentrate, then; diffuse work seldom leads to mastery, to satisfaction or success. Choose a subject and as far as opportunity permits study it seriously, in general and in particular, before beginning the exploitation of another, is the advice of one who has had some experience following this method. For instance, let us take the deciduous trees in our neighborhood. For contour, they should be photographed in full foliage and after the leaves have fallen, isolated and growing under forest conditions. Making negatives from the same point of view in summer and winter is most useful. Then make a study of the barks of the same trees. Follow this by a study and the making of careful photographic records of their flowers and seed vessels—an interesting work and one that will put us in possession of a wealth of most fascinating pictures to be treasured alike for their beauty and educational value. Finally, take the leaves, either singly or on a small branch; study and memorize their shapes and peculiarities and make photographic records of them. In this alone there is two or three season's work, even though but half a dozen trees be studied. It will not only afford much interesting and recreative in-door and out-of-door work, but will give us such a knowledge of our trees as few to-day possess And the probabilities are that we shall also have many beautiful photographs that will delight and instruct us and our friends.

Subjects might be mentioned without number, but they will occur to every earnest worker. Our object was to indicate how the camera may be made of valuable assistance in the study of Nature, and in this we trust we have been in a measure successful Photographic work and Nature Study are mutually helpful—they progress together—and the writer can honestly affirm that the pleasures and usefulness of both the art and the science are enhanced by their happy combination.

Experimental Farm, Ottawa, Nov. 15, 1904.

THE OTTAWA NATURALIST.

VOL. XVIII. OTTAWA, DECEMBER, 1904. No. 9

THE WINTER FRINGILLIDÆ OF NEW BRUNSWICK.

By WM. H. MOORE, Scotch Lake, N.B.

The list of birds given below includes the members of the finch and sparrow family which occur in New Brunswick, during the months of December, January and February. During these three months migration is as nearly at a standstill as at any time during the year. This family is represented by more species than any other family of birds at this season So far as known twelve species may occur here during the winter, in greater or lesser numbers, being sometimes plentiful and even abundant and in other years rare. The winter of 1902-3 brought several surprises. The regular winter birds were no more plentiful than common, but some of the summer birds remained throughout the winter, and were really more common than is usual during summer. This fact caused the writer to believe that migration is not governed by temperature alone, but more by the food supply. That winter the conifers, birches and alders carried a good supply of fruits upon which the *Fringillidæ* fed. During the summer of 1903 it was noticed that there were no new cones upon the coniferous trees, and a nearly birdless winter was predicted to follow. The prophecy was correct, the birds were very scarce in this section throughout the winter of 1903-4.

PINE GROSBEAK. *Pinicola enucleator.*

This is a rather rare summer resident throughout the southern half of this province. They come south in autumn in flocks of from three or four to fifty. By people little acquainted with birds they are often mistaken for robins. Their habit of living in summer in coniferous forests, generally far from the haunts of man, causes them to have little fear of him when they come south, and one may approach quite closely to examine them.

Their food in winter consists of almost any of the persistent fruits. A favorite food is the seeds of the mountain ash, which they pick from the trees and even from the ground where they have been blown by heavy winds. This winged fruit they dissect taking only the meat. Apples left upon the trees are also eaten. At times the pulp is cast away and only the seeds eaten, and again their crops have been found to contain the pulp. They also feed upon the fruit of the sumach. Their never failing diet is the tips of twigs of the fir trees. These tips are bitten off, and to reach them the birds at times hang nearly upside down, as the lithe limbs bend with the weight of the birds. When this food has been eaten the bill is coated with balsam. Elm buds also are eaten after they begin to swell in spring.

The flight of the pine grosbeak is slightly undulating, and when on the wing they often emit a soft loud whistle, by imitating which they may be induced to alight near by. Some ornithologists claim that this species nests far north, and so early in the spring that the eggs are laid before the snow has gone. This may be true, but it is also true that they breed in New Brunswick in the month of July.

PURPLE FINCH *Carpodacus purpureus.*

This species is in appearance a small edition of the pine grosbeak. The males much resemble each other in color, but the females and young males of the purple finch lack the yellowish breast and rump of the grosbeak. This species stayed throughout the winter of 1902-3. They were often heard to sing, but the song lacked the energy that is given it during the nuptial season. The song of the young male is not so rich as that of the adult male, and consists of a few short notes in place of the long, flowing song of adult. The males do not attain the purple plumage until the second year. Their food in spring is buds of various trees, the favourite being those of the poplar and the balsamy buds of the fir ; later, insects are added to the bill of fare. An adult male was observed in October eating the woolly aphis which infests alder bushes. Although arriving from the south early in spring the nesting season is deferred until after the middle of June.

ENGLISH SPARROW. *Passer domesticus.*

This species lives in winter in towns and villages. The families raised throughout the country in summer return to their winter quarters during October. A few pairs nest even in winter. In April they begin to scatter about the country again.

RED CROSSBILL *Loxia americana minor.*

This species was very common during the winter of 1902-3, feeding upon the salted gravel which we put out upon a small board for them. This preparation they ate greedily, seeming to be particularly fond of the salty flavor. They were joined at the salt-lick, as we termed it, by the white-winged crossbill, pine finch, goldfinch and redpoll. When eating they would turn the head, side downward, to enable them to catch up the particles in the bill. When licking the salt the tongue would be extended, until the base was out past the tip of the bill. The tongue would be protruded and withdrawn four times per second. They nested during the winter, as we now saw them collect tendrils from a vine at the house, and also observed them getting wool. The females only were collecting the material, their mates assisted by doing the looking on. In February young birds of this species came to the salt-lick, and still had the down adhering to the tips of their feathers,

WHITE-WINGED CROSSBILL. *Loxia leucoptera.*

This species may be termed a rare visitor in the vicinity of Fredericton, yet they are known to live in summer in the northern highlands of the province. Occasionally they come this way and at times are fairly common. This species, like the preceding one, feeds upon the fruits of spruce, black alder and birch, and like the former rears its young in winter. The wing-bars, of the first plumage of the young, are of a tan color. The song of the adult male is somewhat like that of the purple finch, and is poured forth while the bird is on the wing, either circling above and around his mate, or when floating in the air after the manner of the purple finch. Beautiful indeed are they as they display their colors, some clear sunny day, against a background of snow-laden conifers.

HOARY REDPOLL. *Acanthis hornmannii exilipes.*

This species has been taken at Peticodiac, in eastern New Brunswick, and is considered very rare.

COMMON REDPOLL. *Acanthis linaria.*

These birds are so erratic in their wanderings that one winter they may be abundant, next winter none, or come in autumn, pass on and not be seen here again until the following winter. Their favorite food is the fruits of the yellow birch and black alder. Weed and grass seeds are also eaten extensively. The writer has watched redpolls feeding upon seeds put out for them. They would feed for seven hours daily, and at the rate of fifty seeds per hour. This species should surely be befriended by the "Man with the hoe."

AMERICAN GOLDFINCH. *Spinus tristis.*

During the winter of 1900-1 goldfinches were observed here, February 15th, a very unusual occurrence, the usual time of arrival being in May. The greatest surprise came two years later when this species stayed all winter. The males were about the same color as the female's summer plumage, being entirely unlike the bright yellow plumage they wear in summer. The crown lacks the black cap, being the same color as the back. By the first of April the color of the plumage began to change. A few black feathers began to come in the crown and the body feathers began to show some yellow. By the middle of May nearly all were changed to the garb of summer. They fed throughout the winter upon the fruits of the yellow birch and cedar or arbor-vitæ.

PINE FINCH. *Spinus pinus.*

This species, like the redpoll, is so erratic in its movements that one never knows whether or not it will occur during the winter season, yet it is during the winter that we are most sure of its presence. They, like the goldfinch, feed upon the fruits of the yellow birch and arbor-vitæ. When occasion demands they are pugnacious mites, as when at the salt-lick they would drive the crossbills away. The yellow of the plumage is much more bright in spring than in autumn. When the male is paying his respects to the female of his choice, he displays his colors to good advantage, and as he performs in her presence with out-spread wings and tail, he is truly a beautiful little bird.

SNOW BUNTING. *Plectrophenax nivalis.*

This is the most easily recognized of any of our *Fringillidæ* of either summer or winter. Their food consists of seeds of weeds and grasses, of which they get an abundant supply in haystacks. It is alleged by some writers that snow buntings never perch on trees, but it is not uncommon to see them resting upon trees when not feeding, and I have observed them perched upon telegraph wires. Near our house is a spring stream that stays open all winter. One day four snow buntings were observed to come and bathe in the stream. They fluttered and splashed in the water as we often see birds do in summer, and then as if to dry their plumage they fluttered into the loose snow along the stream, working their way into the drifts until nearly buried. The whole performance occupied about five minutes. To one of us it would have been five minutes too long, as the temperature was several degrees below freezing and the snow was blowing along very freely.

TREE SPARROW. *Spizella monticola.*

This species is most common along river valley roads that are ringed with thickets of bushes. Seldom more than two or three are seen in one company. They are not common in winter in this section.

SLATE-COLORED JUNCO. *Junco hyemalis.*

A few individuals of this species are apt to remain with us throughout the winter. Their stay is probably regulated by the food supply. They evidently feed upon seeds taken off the ground or from low weeds.

SONG SPARROW. *Melospiza fasciata.*

It was another surprise to learn that this species also occasionally remains with us all winter. They are not rare along the southern coast in mild winters, but until the last two winters no record was known of their presence in the interior of the province. The last two winters some have stayed near here. They lived about a grist mill, and were supplied with food by the miller, who threw out foul seeds to them.

EXPERIMENT ILLUSTRATING THE CIRCULATION OF FLUIDS AND VITALITY IN PLANTS.

By an Ottawa Naturalist.

For some years back I have had a violent fancy for the common buttercup, (*Ranunculas acris*, L., introduced from Europe) which has spread so rapidly and in such numbers in our meadows, fields and orchards that it is one of the very commonest weeds in many portions of Canada to-day.

It is in point of construction one of the most perfect of our flowering plants. Look at its roots, its stem, its leaves, its hairs, its branches, petioles, flowers ; the calyx, corolla, stamens, anthers, pistils, stigma, everything about it, and note the order. shape, relations and arrangements of these parts and their symmetry ; keep this order in your mind as representing the type of a large and important family of plants, the family which stands at the head of all plant-life in point of perfection. There are many interesting experiments and studies which centre round this species.

The following experiment with a wilted sprig of the common buttercup, which measured nine inches in length, will serve to illustrate not only the great rapidity with which this species takes up moisture—water—through its marvelous system of canals in its internal construction, but also the vitality which it exhibits.

Taking this nine-inch specimen of the common buttercup which, by the bye, had remained for fully an hour and a half in a glass without water, it was observed that all the flowers and buds at the tops of the branches or petioles had wilted, and to such an extent that some were hanging with their receptacles facing the ground and for quite a distance back some of the petioles also were seen to be in an inverted position, at right angles to the horizontal.

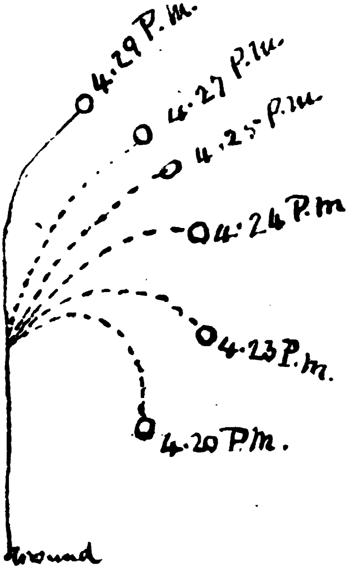
It may be noted that the wound made to the plant, where it was severed, two or three inches from the root, as is the case in most plants had been partially closed up by dint of the constriction which took place in the shredded cells during the drying process. This phenomenon appears to indicate the provision made or contrivance used to retain as long as possible whatever moisture the plant holds. A fresh and clean cut was then made by means of a sharp pair of scissors, a few millimetres above the old wound. It was twenty minutes after four in the afternoon when the plant was cut and placed in the glass with a little water at the bottom in order to test the absorption power and vitality in the specimen at hand.

In less than one minute there was a clear evidence of a stiffening in the wilted petioles which formed decided curved lines or arches with the flowers and buds drooping or inclined at various angles.

At twenty-three minutes after the hour, there were clearer signs of a revival, and the buds and flowers had begun to raise their heads from the positions in which they severally were at the outset, and the topmost bud had changed its posit on fully 30°. Following the course pursued by this bud, at twenty-four minutes after four, it was fully 60° away from its first position. At twenty-five minutes after, this bud had made an arc of a circle subtending a right angle or 90°. At twenty-seven minutes after, making seven minutes after the experiment was begun, the topmost bud, and the part of the petiole supporting it showed no sign of wilting or prostration, but was gradually and effectively reaching the normal position in the fields, having raised itself an additional twenty-five or thirty degrees. At twenty-nine minutes after the hour, by far the longest part of the petiole was quite erect with the terminal bud very nearly vertical.

Thus it appears that in nine minutes of time only, the drooping and prostrate bud, which had been cut off from the natural and and steady supply of moisture for its support, after the plant had been immersed, at its wound, in water, had taken up sufficient moisture to restore and revive its branches, causing them to raise their heads, describing an arc subtending an angle of fully one hundred and fifty degrees.

When the experiment was first tried it was further noted that the first branches to give evidence of new life and vigor, were those nearer to the base or root. The first branch took the first supply of water, and the second branch took the next on, in regular order to the top. The topmost bud was the one selected for the experiment and calculations which proved most interesting. A sheet of white paper was placed on the table behind the glass and as the flowers and buds rose, their precise location indicated on the paper. The different readings of the terminal bud are given in the accompanying diagram.



4.29. Sixth stage. Almost vertical.

4.27. Fifth stage. Nearing the vertical.

4.25. Fourth stage. One hundred and ten degrees change.

4.24. Third and intermediate stage.

4.23. Second and partially revived position.

4.20. First and prostrate position of bud.

I have no doubt that tables of relative speed giving the ratio of absorption of different plants and different parts of the same plant would be interesting data concerning the duration of life and vitality in plants. This would also form an exceedingly interesting pastime to anyone seeking a few minutes' pleasant recreation during the summer season.

It may be added that after removing the same specimen from the water and allowing it to droop again, it was ascertained, in two successive experiments that the vitality and power of absorption as exhibited in the degree of energy displayed in the buds and flowers re-assuming their natural and relative positions, diminished each time.

The last two experiments were made about an hour apart and the plant revived much less rapidly than in the first experiment, which was then several hours after the plant was gathered in the fields, the plant exhibiting such difficulty in retaining its natural position that even after making a fresh cut there was but very little energy displayed on the part of the plant, and the experiment which for the time being proved so intensely interesting was abandoned.

A similar and collateral experiment was made at the same time with a field daisy (*Chrysanthemum leucanthemum*, L.) another introduced plant, a weed, but a beautful one, and it seemed to show that the process of absorption in this plant was much less rapid and effective than in the common buttercup.

It is a well recognised fact that the buttercup grows best in the dampest places in fields and meadows.

In the moist atmosphere and prevailing damp climate of the Maritime Provinces where the experiment was made, buttercups grow in what appears to be dry places, but in reality the air is so saturated with moisture, hygrometric readings being always high, that a plant, like the buttercup, requiring moisture, feels at home anywhere.

I would strongly recommend some of our your younger naturalists to try the experiment for themselves with the common buttercup or any other plant they may choose within their neighbourhood during the coming season.

McArras Brook, Antigonish County, N.S.

THE ANNALS OF THE FALL MIGRATION.

By A. B. KLUGH, Guelph, Ont.

The first intimation of the fall migration of 1904 was given by the bobolinks, our breeding birds disappearing on Aug. 3rd, and the first of the more northerly birds being seen on Aug. 12th. The cliff swallow was the next to depart, leaving on Aug. 14th. On Aug. 17th the yellow warbler, which had not been present in its usual numbers, took its departure, and the first black ducks were seen. On Aug. 19th, the warbler hosts from the north were ushered in by the appearance of the Tennessee, a single specimen being taken on that date. A small flock of mourning warblers, the males in full song, was noted on Aug 21st, and this was the last seen of this species, which is a scarce summer resident here. On Aug. 23rd a Cape May warbler was taken while flitting about in the tops of some white pines in the centre of a mixed bush, and proved to be an adult male. A flock of black-poll warblers was noted on Aug. 30th. and one of bay-breasted on Aug. 31st and on the latter date another Tennessee was taken. Sept. 4th saw the departure of the night-hawk and indigo bunting, and on Sept. 5th the last Wilson's thrush was observed. On Sept 6th, the wood thrush, whip-poor-will and wood pewee were noted for the last time, a flock of northern Parula warblers appeared, and a Philadelphia vireo was taken. Sept. 7th saw the last of the bobolink, barn swallow and tree swallow, and on Sept. 8th the kingbird departed. On Sept. 8th also the first flock of myrtles from the north arrived ; previously to this I had only seen the families of those (three pairs) which had bred here. The Blackburnian warbler and northern Parula were seen for the last time and a Connecticut warbler taken on Sept 9th. Sept. 10th witnessed the departure of the waterthrush, and the first palm warbler and a flock of Tennessees (the last seen) were noted. On Sept. 12th the olive-backed thrush was seen, and on Sept. 13th the scarlet tanager and oven-bird departed and the ruby-crowned kinglet and brown creeper appeared. None of the last-named species bred in the vicinity this year though they usually do so. On Sept. 14th the last was seen of the green heron, a pair of which species bred in this locality. On Sept. 15th flocks of slate-colored juncos from the north augmented the small numbers of that species which had been reared in the vicinity, the gray-cheeked thrush was noted and the red-winged blackbird seen for the last time. The 17th saw the last of the bay-breasted warbler, and chestnut-sided warbler, a few broad winged hawks were noted and another adult male Cape May warbler taken. This bird was in a flock consisting of chickadees, black-throated green warblers, myrtle warblers and chestnut-sided warblers. The crested flycatcher left on Sept. 18th and on Sept. 19th the American redstart was noted for the last time and the last Cape May also, an adult male, taken. The black-throated blue and palm warblers, Maryland yellow-throat, Savanna sparrow, cowbird and catbird were last noted on Sept. 20th, and the horned grebe and yellow-bellied sapsucker appeared. The last species is a scarce summer resident here, and none bred in the immediate vicinity this season Sept. 21st saw the departure of the cedar waxwing, magnolia warbler, and sharp-shinned hawk and the first fall American herring gulls were noted. On Sept. 22nd the last red-eyed vireo and black-and-white warbler were noted, also a flock of white-crowned sparrows and three white-winged scoters. The rusty blackbird, American pipit and ruddy duck appeared on the same date and a flock of surf scoters was seen. On Sept. 25th a red-tailed hawk, seen here only on migrations, was noted. The last ruby-throated hummingbird and American bittern were seen on Sept. 26th and the black-throated green warbler, black-poll warbler, blue-headed vireo and yellow-bellied sapsucker left on Sept. 27th On the same date the hermit thrush was first noted. Sept. 28th saw the departure of the phœbe and red-shouldered hawk ; an American osprey was noted on the same date, and on Sept. 30th the last was seen of the Nashville warbler, an abundant migrant and scarce breeder in this locality. On Oct. 1st the first redhead was noted. On Oct. 3rd the house wren disappeared and the only green-winged teal seen this fall were noted. On Oct. 11th the last meadowlark was seen and on Oct. 13th the last flickers and swamp sparrows. Oct. 14th saw the last of the towhee, chipping sparrow, purple finch, hermit thrush and myrtle warbler, and on Oct. 15th a pigeon hawk was seen. On Oct. 16th the winter wren disappeared and on Oct.

20th the last kingfishers, rusty blackbirds, white-throated sparrows, song sparrows, vesper sparrows and bluebirds were seen. On the same date the tree sparrow appeared. Oct. 28th saw the last of the ruby-crowned ringlet and the first for this fall of the American scaup duck. On the same date two flocks of fox sparrows were noted. On Oct. 31st the black duck and redhead were seen for the last time, the red-breasted merganser and bufflehead appeared, a pair of hooded mergansers, and three Canadian jays were noted. On Nov. 1st a flock of pine siskins were noted and the last American robin seen. On Nov. 3rd the last was seen of the mourning dove, a mallard and two American mergansers were noted, and the northern shrike appeared. Nov. 6th saw the last of the marsh hawks and the first of the redpolls.

A SERIOUS MISUNDERSTANDING BETWEEN MY SQUIRREL AND ME.

By M. E.

My home has been aptly described as "a large bay-window, a wide verandah, and an over-hanging willow-tree, with a small house in the rear." I live in the small house in the rear; my squirrels live everywhere else. My family is even smaller than the house; the squirrels I have never been able to count; but a small neighbor, who visits in their family, tells me that he counted twelve, at one time, and saw two more directly after. I can boast of feeding four, under the willow-tree, one afternoon last summer. As a rule, however, there are only two; a small, shy one, and a great, fat, tame one They run up the willow-tree and out on a bough that overhangs the verandah roof and jump on my window ledge, hunting for nuts, which they seldom fail to find—now in one corner, now in another—where every day I hide them.

One day, when the window was left open, one of them came in, and finding the basket of nuts on top of the secretary, upset it all over the floor. Such a noise! Such a panic! No one will ever know who beat in that race, for I flew up and the squirrel flew out, and we both agreed to say nothing about it. He has charming manners when he chooses: but, like some other persons, "when he is bad, he is horrid." If, for example, he catches the thin squirrel hunting for a nut, he just gives him a smart box on the ear and sends him about his business. If I remonstrate, he says that the other one is so small that he does not need much food, and that nuts, in particular, are apt to disagree with him and make him sick in the night. After that, of course, there is nothing more to be said. When I am in the room the squirrel never touches the nut-basket, but sits up and begs, curling his great tail over his head and pressing his small paws on his little white stomach, as much as to say:

"See, how much I love you!" or, "See, how hungry I am!" (For squirrel language is as easy to understand as any other, when once you have learned it.)

But, alas! and alas! there came a sad day when my squirrel and I had a quarrel. And thus it came about. There is no squirrel large enough to hold, inside of him, all the nuts he will take, even allowing for the worst kind of indigestion; accordingly, being of a thrifty turn, he buries the nuts, one at a time—each, I think, in a hole of its own, covering it neatly so that no one would dream of there being anything hidden.

On the day of which I am speaking, my squirrel, being full to bursting, buried nut after nut, taking each one delicately from my hand, balancing himself the while, with his sharp claws curled around my fingers. At last, taking a nut (and rolling it over and over in his mouth, after the manner of squirrels), instead of running down the willow-tree, he went to the end of the window-ledge and laid the nut down in the grooves made for the window. There he scratched and clawed, and burrowed and patted until he had settled that nut; then, turned again and begged for more. I gave him another, which he carried down the tree as usual. In a moment I saw him on his way back, and, without thinking, I picked up the nut that he had with such industry buried in the groove. He sat upon his hind legs, curled his tail at ease, clasped my fingers in his claws and opened his mouth for the nut. Suddenly, he stopped—reared himself to his full height, threw back his head and looked me square in the face.

"Do you mean to tell me," he began, then sniffed at the nut.

"Impossible!" I heard him exclaim under his breath.

He dropped down and walked straight to the spot where he had buried his nut. He sniffed, he snuffed, he scratched, he clawed, he burrowed. The nut was gone! He came back to me, raised himself once again by my fingers and, to cover all possibility of mistake, took one long, last smell.

"How did you *dare* to touch that nut?" he asked: "It was not *your* nut."

With that he left me and—the nut; and I heard him say, as he crept thoughtfully down the tree:

"Schopenhauer was right, after all, when he said that 'Women do not understand the first principles of honor and justice. . . . . . Nothing should be left to their control: neither children, nor houses, nor lands, nor money,' nor, above all things —*Nuts!*"

Cambridge, Mass., U.S., Nov. 1, 1904.

ADDENDUM.

One of the charming features of Cambridge, Mass., where the writer of the above interesting note lives, is the number and tameness of the beautiful Gray Squirrels, which being protected and fed by kind lovers of nature, run everywhere through the large gardens and lawns, and may frequently be seen and approached, within a few feet, even on the roads and sidewalks. This shows how quickly wild animals will make friends and live with men, as soon as the latter will restrain their savage instincts of wanting to kill everything smaller than themselves or that they are not afraid of, or when they are compelled by law to act as if they were civilized Christian beings. The time is now coming near when we may hope to see our streets brightened with flocks of beautiful Pine Grosbeaks. It would be well for all members of our Club to make a point, whenever opportunity occurs, of trying to put a stop to the senseless destruction of these by thoughtless boys, who, owing to the confiding nature of these gentle birds, can catch them without trouble when feeding on the scanty food provided by the mountain ashes along our streets.

J. F.

CORRESPONDENCE.

METLAKATLAH, B.C., Nov. 5th, 1904.

The Editor OTTAWA NATURALIST.

DEAR SIR,—Enclosed I send you an extract from a letter from Mr. Rathbun, Assistant Secretary of the Smithsonian Institution, in charge of the U. S. National Museum, giving the name of some smallfish sent from this locality. It occurs to me that the identifications contained therein may be of interest to some of the readers of the OTTAWA NATURALIST.

Yours truly,
(Signed) J. H. KEEN.

"The specimens which you transmitted to the National Museum, have been received and examined by one of our ichthyologists, who informs me that they are sticklebacks representing the species *Gasterosteus williamsoni microcephalus.* This species was described by Dr. Charles Girard in the Proceedings of the Academy of Natural Sciences, Philadelphia. in 1854. The specimens which Dr. Girard studied were obtained in Four Creek, a tributary of Tule (Tulare) Lake, San Joaquin Valley, California, by Dr. A. L. Heermann, a naturalist who accompanied the surveying party of the Pacific Railroad route. The range of this particular species of stickleback is along the west coast of America from Lower California to Alaska., It is found in lakes and streams and is generally abundant.

"Sticklebacks of various species are found throughout the northern hemisphere. They are noted for their pugnacity and are interesting for their nest-building habits, a full account of which will be found in Standard Natural History, Volume III, published by S. E. Cassino Company, of Boston, Massachusetts, in 1885.

"With the fishes were found some leeches which have been identified by Dr J. Percy Moore, of the University of Pennsylvania, Philadelphia, as representing the species *Hæmopis lateralis* (Say)."

THE OTTAWA FIELD-NATURALISTS' CLUB.

PROGRAMME OF WINTER SOIRÉES, 1904-5.

1904.

Dec. 16.—Address, by Principal J. F. White, of the Normal School.

The President's Address.

Animal Life in the Hudson Bay region. Andrew Halkett.

The Soirée Committee considered it advisable to substitute for the formal lectures of the past a number of short popular talks each evening on the various branches of the Club's work, and the gentlemen named below have consented to speak on the subjects specified. More detailed particulars will be given through the public press before each meeting. On Zoology descriptions will be given of the life history, habits, etc., of the polar bear, fur seal, whales, star-fish, frogs, sea-urchins and other animals. The characteristic features of the Geology of the Ottawa district will be dealt with and special attention will be given to structural features as well as the history of the abundant fauna found in the rocks and clays. Ornithology, Entomology and Botany will be treated in a similar manner, each speaker giving the results of his personal observations.

1905.

Jan. 17.—*Mammals.* Messrs. Prince, Low, J. M. Macoun and Ballantyne.

Jan. 31.—*Geology.* Messrs. Ells, Ami, Chalmers, Dowling and Keele.

Report of the Geological Branch.

Feb. 14.—*Entomology.* Messrs. Fletcher, Harrington, Gibson and Young.

Report ot the Entomological Branch.

Feb. 28.—*Zoology.* Messrs. Prince, John Macoun, Halkett and Odell.

Report of the Zoological Branch.

Mar. 14.—*Ornithology.* Messrs. Kingston, E. F. G. White, Eifrig and W. T. Macoun.

Report of the Ornithological Branch.

Mar. 21.—**Annual Meeting.**

Ferns of the Ottawa District. T. E. Clarke.

April 11.—*Botany.* Messrs. Sinclair, John Macoun, Fletcher, Campbell and Attwood.

Report of the Botanical Branch.

All the meetings will be held in the Normal School, at 8 o'clock p.m., sharp.

President, W. T. MACOUN.

Treasurer, A. GIBSON.
(Central Experimental Farm.)

Secretary, T. E. CLARKE.
(470 O'Connor st.)

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A LANDSLIDE ON THE LIEVRE RIVER.

By ALFRED ERNEST BARLOW.

(Published by permission of the Acting-Director of the Geological Survey of Canada.)

The people of the city of Ottawa and surrounding country were shocked and alarmed by reading in the early morning paper of Monday, October 12th, 1903, that a landslide of very large proportions had occurred in the vicinity of Poupore Post Office on the Lièvre river, nearly twelve miles north of the town of Buckingham in the Province of Quebec. Many of the details of this catastrophe, as gleaned from the newspaper reports, are no doubt well remembered by most of those who will read this article, which is written in order to describe with greater technicality than is usual in a newspaper contribution, some of the more salient features, furnishing what are considered the main reasons determining and even favoring this wholesale movement of mother earth. The accompanying reproductions, from actual photographs will serve, in a measure, to illustrate the general appearance, two days after the landslide occurred, of the portion affected. An inspection of these will, it is believed, convey a much more adequate idea than is possible by mere words of the great havoc and ruin wrought to what had previously been the scene of peaceful and happy homesteads, whose inmates harbored no suspicion of disaster. The first intelligence reaching Ottawa that such a calamity had overtaken this peaceful community, in the grey dawn of that Sunday morning, was conveyed in a telephone message sent to Dr. Henry M. Ami, by the Rev. William Patterson of Buckingham. This news was received about 10 o'clock, five hours after the movement had ceased. All the first reports were, of course, of a rather vague and contradictory character, but ignorance of the details of the situation did not prevent the spreading of greatly exaggerated statements, not only in regard to the extent of the damage inflicted, but also as to the consequences that were sure to follow. It was greatly feared, and firmly believed by many, that the release of the dammed-up waters threatened the safety not only of all the residents in the Lièvre valley below the slide, but also of the town of Buckingham. The urgent necessity for more accurate and detailed information was fully appreciated by Dr. Whiteaves, who, in Dr. Bell's absence, was acting as Director of the Geological Survey. Dr. R. W. Ells, who had previously examined and reported upon the geology of the district in which the slide had occurred, was given charge of the examination, while Mr. LeRoy and the writer accompanied him, to make any necessary surveys and secure such photographs as would fully illustrate the occurrence. The Summary Report of the Geological Survey Department for 1903 contained Dr. Ells' official account of the landslide, accompanied by a small plan showing the position and extent of the area affected. This map, on a scale of twelve chains to one inch, was prepared by Joseph Keele from surveys made by James White, O. E. LeRoy and the writer.

Like the proverbial policeman, the Government geologists were early on the scene after the catastrophe, leaving Ottawa by the evening train of Monday, October 12th, for Buckingham. During the journey, all sorts of rumors were afloat as to the danger threatening the mills, and even the town of Buckingham itself, by the backing-up of the waters caused by the filling up of the channel of the river by the debris from the landslide. On our arrival at Buckingham, however, we were reassured by the report that the water had surmounted these clay barriers, about four o'clock that afternoon, and was flowing over this uneven surface of accumulated material, by a series of small channels, which would certainly deepen during the night. We, therefore, retired to rest at the hotel, with a sense of tolerable security, feeling that the crisis had passed. The morning broke bright and clear and we made an early start for the scene, driving up the road on the west side of the river as far as Brazeau's house. Leaving our horses there, we immediately began our examination, walking around and across the whole area, taking such photographs as would illustrate fully the phenomena witnessed and making such surveys as were necessary to show the position and extent of the area affected.

This remarkable and extensive landslide occurred on the southwest bank of the Lièvre River, in the early morning of Sunday, October 11th, 1903. The first disturbance was felt at 4.45, while it was yet dusk, and with the exception of some minor disturbances, the whole movement was completed by 5 o'clock. It was not attended by any noise, except that produced by the straining and cracking of the timbers of the various barns and structures affected. The simultaneous transportation of such a large amount of material into the bed of the stream at once completely choked it up, forcing the water to either side, thus flooding the banks, the water reaching to the lower windows of the farm houses. (Plate III.) In all, about 100 acres were affected by the movement, and the larger portions of three farms were rendered practically useless, at least for some time to come. Time will efface many of the inequalities, but the area will never present the same beautiful, sloping farm-land which was looked upon as one of the most desirable agricultural sites in the whole of the Lièvre valley. The excavation caused by the landslide, for most of it is from 25 to 30 feet below the original level, comprises portions of lots 25 and 26, con. XI, of the township of Buckingham, and lots 7 and 8, con. I, of the township of Portland East, The farms which suffered belonged to Alexandre Clèment, Maurice Brazeau and Duncan McMillan. Only one residence, that belonging to Clèment, was moved. This house, originally situated about 100 feet south of the road which here formed the boundary between the two townships (Buckingham and Portland East), and thus within the former township, was moved about 100 feet north of the road into the township of Portland East, while, at the same time, the area of land, immediately surrounding the house, was lowered *en bloc* about 20 feet. The disturbed area has a somewhat irregular outline, extending back a distance of about 700 yards from the river to the base of the hills of gneiss and granite, which here form the southeastern edge of the valley. (Plate V, Fig. 1.) Along the river front, the length of the landslide was nearly 600 yards, but near its eastern end a small wooded knoll rises above the general level to a height of about 35 feet, which must be either underlain by rock or made up of a very homogeneous and impervious clay. This small hill, forming a rudely triangular buttress, with the apex towards the land and a base measuring about 100 yards along the river, remained unaffected by the movement. The slide thus divided into two parts, by far the larger amount of material reaching the river to the west of the small hill already mentioned. The greatest excavation is as usual along the base of the hill and at the western or upper end of the slip, while the crevasse, marking the eastern limit has been concealed, to a large extent, by the piling up of material into a series of hills, rising from 12 to 30 feet above the clay plain, and made up of loose material derived from the rest of the area. This crevasse, which originally marked the eastern limit of the slip, ran with a gentle curve immediately to the west of Brazeau's residence, the movement overturning his barns and some outhouses, although the residence, carpenter-shop and milk-house were not affected in the general commotion. There were likewise no cross fractures produced in the area on which the house stood, for the water in the well, which is about 12 feet deep, showed no signs of any disturbance. The western limit passed close to the east of Duncan McMillan's house and outbuildings, some of the latter being on the verge of the crack thus produced, while the southeastern edge reached to the slope of the hills of gneiss and granite which here mark the limits of the valley. The Government dam, which was completed some years ago, was pushed about 100 yards from its original position and now points up instead of across the stream ; while the locks, constructed at great expense, were filled almost completely with the debris from the slide. A barn, full of hay, situated near the middle of lot 7, con. I of Portland was carried down the stream, on a huge block of clay, and now occupies an island in the river, nearly half a mile from its original location. Happily not a single life was lost, though, in the circumstances, it seems miraculous that all escaped. About ten head of cattle were killed and some of these were completely entombed by the overturned clay. Only one man was an eye witness of the whole of the scene, and at the time of our visit it was believed that his mind was permanently unbalanced by what he saw. Alexandre Clèment, standing on the threshold of his front door, saw the slow and deliberate differential movement of the huge blocks of land, which tilted his barns, smashing many of the timbers and boards in the commotion. (Plate V, Fig. 2.) On the opposite side of a large crevasse, which he saw open slowly almost at his feet, a huge block of land appeared to rise to a height of perhaps twenty or more feet. Subsequent examination shows this to have been an optical illusion, for in reality, this land which appeared to rise, remained practically stationary, while, on the other hand, the portion on which his house rested, slowly sank from 20 to 30 feet below its original level. In addition, the whole farm and adjoining district seemed to him to be slowly, but surely, moving towards the river and, after what appeared an eternity, the whole commotion subsided. So gradual and uniform was the motion in the vicinity of Clèment's house, that a glass of water, which was filled and standing on the ledge of the front window, was still in the same condition, when the landslide was complete. The water in the well, which was about 12 feet deep also remained at its normal level, showing that no crack was formed in this part of the block of land.

Such landslides are by no means of infrequent occurrence along the banks of rivers which flow through similar clay flats, but, for the most part, only small areas, in the more immediate vicinity of the river, are affected. Several landslides have, however, occurred, within the last sixty-five years, along some of the tributaries of the St. Lawrence river, which were of such magnitude, and attended with such direful results, as to warrant special examinations being made, with a view not only of determining the extent and nature of the damage inflicted, but also, if possible, to reach a definite conclusion as to the causes which bring about such wholesale and profound disturbance of areas, hitherto considered more than ordinarily secure and solid.

The first landslide in the Province of Quebec of which we have any record occurred on the Maskinongé river in 1840, and was described, in some detail, by Sir William Logan.* The point at which the landslip occurred is nine miles from the granite hills, and where the river is 10—20 yards wide and changes its direction from south to west for 700 yards. The movement commenced about 8 o'clock on the morning of the 4th April, 1840, when the snow was still on the ground. The marly clay first detached was about 200 yards in breadth, and 700 yards in length ; it was followed at intervals of a few minutes by four other movements. The whole of the area thus affected amounted to about 84 acres, and the total length was 1,300 yards. The breadth varied, the narrowest part being nearest to the river and the widest, equalling 600 yards, a considerable way from it. The moving mass first crossed the stream and then splitting against the opposite bank, where it averaged a thickness of 75 feet, one-half turned up the valley for about three-quarters of a mile and the other half down it for an equal distance, forming a dam half a league in extent. The whole operation was completed in about three hours. No lives were lost, but two farms were destroyed, while cattle and other live stock perished with the falling buildings.

The St Albans landslip, described by Mgr. Laflamme† of Laval University, occurred on the 27th of April, 1894, on the west bank of the Ste. Anne de la Pérade, about four miles above the village of St. Albans, or seven miles distant from the Rivière Blanche. Here the surface deposits, made up of Leda clay and Saxicava sand, slid down into the valley of the river for the space of three miles and a half. The landslip was in three parts, the first movement being at the northern end where it was about ten feet deep. This was followed after some hours by another which took place immediately to the south and finally a third descended just below the second, leaving a pit 175 feet deep. The average depth of the whole chasm was not less than 100 feet below the general surface of the ground and its width about a mile. The mass of material thrown into the valley of the Ste. Anne permanently changed the course of the river. The Rivière Blanche landslip described by Dr. Chalmers was closely simliar to that of the Maskinongé river described by Logan. It took ,place on the east bank of the Blanche, a tributary of the Ste. Anne de la Pérade at St. Thuribe, about 3 miles north of St. Casimir village. The chasm remaining from this landslip is also irregularly oblong in shape, like that of the Maskinongé valley with the narrowest end towards the Rivière Blanche. At this point the breaking down of the beds began and through this opening the whole of the material of the landslip was discharged. The length of the pit, east and west, is about 1,050 yards; extreme width 600 yards; maximum depth about 28 feet; total area 86 acres. The descent of the bottom throughout its whole length is approximately about 27 feet or about 10 inches to the hundred feet, and the gradient is comparatively uniform from the eastern end to the present bottom of the river. Indications of a movement of the clays was first seen on the evening of the 6th of May, 1898, in a small hollow in the bank, down which a trickling stream ran; but no attention was paid to it. About 5 o'clock on the morning of the 7th, the breaking away of the clay beds began where some slipping had been noticed on the previous evening. The softer material flowed out from beneath, while the upper and more coherent clay split off in vertical sheets and columns which were borne away in the sliding, surging mass. This continued for upwards of three hours, when the transporting power seemed to have spent itself, and the great masses of clay, which had become detached from the walls of the chasm, were stranded in its bottom and at the time of examination were seen standing in various positions, some of them resembling cones, pyramids, etc.‡

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* Proc. Geol. Soc. Lon., Vol. III, 1838-1842, pp. 767-769.

† Trans. Roy. Soc. Can., Vol. XII., 1894, Sect. IV., pp. 63-70.

The causes operating in the production of all these landslips may be summarized under two general headings :—

1. The presence of silty, sandy, or gravelly portions or layers in these stratified clays, renders these and some of the adjacent portions capable of absorbing and retaining a large amount of water. According to Mr. R. A. A. Johnston, of the Geological Survey, who made an analysis of the clays obtained from the

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‡Ann. Rep. Geol. Surv. Can., Vol. XI., 1898. Part J, pp. 65-69.

Rivière Blanche landslip, they contained, when saturated, from 22 to 25 per cent. of their own weight of water.

2. Increased or unusual precipitation, which furnishes the great excess of water necessary to produce that condition of supersaturation of certain portions of the clay which eventually brings about unstable equilibrium of the beds. Thus, certain layers or portions of the clay are in a semi-liquid condition, and examination of the Lièvre occurrence shows a considerable portion of the clay to have about the same consistency as ordinary thin porridge. The extra weight of the overlying material, due to the unusually large amount of contained water, results in the displacement of those portions or blocks of land which are underlaid by the supersaturated or liquid clay. Movement once begun gathers force and quickly extends the area affected, and the existence of even a very gentle gradient imparts an irresistible movement towards the lower ground in the vicinity of the river.

The flats which border the Lièvre river in the neighborhood of the recent landslip are principally made up of very thick and uniform beds of a stiff, impervious bluish-gray clay, with small and subordinate layers of silty, sandy or gravelly material. This drift material forms a plain, which, with very occasional minor depressions, occupied by small marshes or creeks, extends to the base of the rocky hills. Between this clay and the solid rock beneath, along the base of the hills, there generally intervenes a considerable layer composed of boulders or coarse gravel. Most of the surface drainage from the rocky hills flows out along the top of this plain, reaching the river through one or two small brooks. A large proportion, however, of this surface water flows downward through the coarse gravel and boulders, finding its way into the various sandy or silty layers and thus feeding the wells which are located on one or other of these layers. The introduction of this water serves to produce the necessary degree of saturation. During extreme wet seasons, like the summer of 1903, the amount of water thus flowing into and along these permeable layers must be very large, and with long-continued and unusual precipitation the saturated clay is being constantly increased, until the limit is reached and the necessary conditions of unstable equilibrium are produced. As a result it occasionally happens that the stiff and more coherent masses of clay are broken down and mix with the softer material, the whole mass of clay, sand and mud being tumultuously and irresistibly moved forward and downward into the basin of the river.

According to Mr. R. F. Stupart, Director of the Meteorological Office, Toronto, (see accompanying table,) the average rainfall at Ottawa for the five months commencing June and ending in October, for the past nineteen years, was 14.62 inches. The rainfall during the summer of 1903 for a similar period was 19 44 inches. This abnormal precipitation doubtless contributed in no small measure to the catastrophe.

Sir William Logan, commenting on the cause of the Maskinongé landslip, was of the opinion that it was induced by "pressure on an inclined plane assisted by water;" and though he was not able to determine the nature of the subsoil, he believed, from a survey of the surrounding country, that it consists of Silurian limestone, the dip of which is, where visible, in the direction of the river.

At no point, so far as our examinations extended, did the Lièvre landslide reach the underlying solid rock surface, the gliding plane being in every case composed of the underlying impervious clay or hard-pan. This very smooth and striated surface, as shown in the accompanying illustration (Plate IV), was visible at several points along the base of the hills, as also on the western side of the wooded knolls situated near the river and which were not affected by the movement.

The motion must have been primarily determined by the presence of rather contiguous and extensive sheets of the supersaturated or semi-liquid clay; for it is obvious that no very steep gradient existed throughout the entire distance. In fact, the observations made seemed to warrant the belief, that the gliding plane was only steep in very close proximity to the rocky hills, while a short distance away, it was more or less undulating with only a gentle pitch outwards and downwards to the river. The original level of the plain, at this point, averages about 25 feet above the river, while the river itself is only about 20 feet in depth. Much of the debris which eventually reached the river was material once situated about 20 feet below the original surface and it was the sudden removal of this underlying material which produced the caving-in of the surface layers, at the same time moving them a considerable distance forward. Most of the trees, except in the vicinity of certain cracks, remained in their original upright position. The motion was spasmodic or halting, owing, doubtless, to the obstruction on the part of the harder and more impervious portions of the clay, so that a number of anticlinal and synclinal folds were produced, while much of the disturbed material showed very excellent samples of block faulting. In many places, owing to this retardation in movement, huge blocks of the hard and impervious clay were shoved up almost on edge through the overlying loam or soil at the surface.

As an immediate result of this landslide, the water of the Lièvre river below was so filled with the finely divided clay as to render it unsuitable for drinking or even for washing purposes. To such an extent indeed was the material held in suspension that even at Montreal, over 100 miles from the scene, the water was quite thick and turbid. The mills at Buckingham were obliged to close down for a considerable length of time as the dirty water clogged the machinery. All the water required for cooking or drinking was obtained from the few wells remaining in the town, that derived from the waterworks being unfit for use.

TABLE showing Rain and Snow Fall at Ottawa during years 1897 to 1903, inclusive.

Compiled under the direction of R. F. Stupart, Meterological Office, Toronto.

	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total for Year.
		in.	in.	in.	in.	in.	in.	in,	in.	in.	in.	in.	in.	in.
RAIN.	1897	0.38	0.35	1.51	1.62	3.31	3.03	5.21	3.40	0.45	0.69	2.19	1.84	23.98
	1898	0.66	0.90	2.13	0.55	2.46	2.24	2.87	3.22	3.48	5.68	0.36	0.41	24.96
	1899	0.75	0.29	1.09	1.03	5.50	2.37	7.62	0.44	4.93	2.47	1.74	2.24	30.47
	1900	0.20	1.20	0.20	0.76	3.00	3.21	5.99	2.72	3.56	1.45	2.40	R	24.69
	1901	0.20	0.00	0.90	2.99	3.91	3.76	3.18	3.23	1.91	1.45	0.40	2.13	24.06
	1902	0.81	0.40	3.14	2.74	1.82	4.29	5.98	1.67	1.23	3.30	1.26	0.80	27.44
	1903	0.96	1.60	1.32	0.85	0.12	6.55	3.24	4.00	2.14	3.51	0.39	R	24.68
SNOW.	1897	15.5	15.7	28.6	2.0	....	....	....	....	....	....	5.8	22.9	90.5
	1898	26.4	34.3	*	2.0	....	....	....	....	....	....	10.7	27.2	100.6
	899	14.1	5.8	45.9	*	....	....	...	....	....	....	*	10.0	75.8
	1900	25.4	14.0	35.0	(10 in. snow = 1 in. water)							11.0	16.0	101.4
	1901	31.1	8.0	13.0	*	....	....	....	....	....	*	18.5	21.9	92.5
	1902	30.9	24.3	3.3	....	....	....	....	....	....	....	2.0	24.5	85.0
	1903	18.6	26.5	0.3	1.0	....	....	....	....	....	R	3.0	18.8	68.2
	AVERAGE PRECIPITATION FOR 19 YEARS.													
RAIN AND SNOW.	}	3.00	2.62	2.89	1.86	2.74	2.95	3.46	3.04	2.66	2.51	2.53	2.96	

R represents only traces of rain.

* ,, ,, snow.

REVIEW.

THE NATURE STUDY REVIEW. Published at 525 West 120th St., New York City, U.S.A. Bi-monthly. Subscription $1 per annum.

"Devoted to all phases of Nature Study in elementary schools," is the comprehensive sub-title of this new periodical, the first number of which has just been issued. In the introduction the editors say that their "plans are based upon an interpretation of Nature Study in its literal and widest sense as including all phases, physical as well as biological, of studies of natural objects and processes in elementary schools." This interpretation of Nature Study includes all the "natural science" studies of the lower grades in the public schools, and it is with Nature Study in relation to elementary school work that THE REVIEW will chiefly deal.

The Nature Study articles published in THE OTTAWA NATURALIST cover much the same field, but important features of THE NATURE STUDY REVIEW are its Book Reviews, Notes on Recent Literature, and Guide to Periodical Literature. These departments will keep both student and teacher posted as to the literature of a subject in which they must perforce interest themselves. The chief Articles in the January number are "Nature Study and Natural Science—a Symposium," "Physical Nature Study," "Nature Study and Elementary Agriculture in Canada," 'Some recent criticisms of Nature Study," "Agriculture in Southern Schools,' "School Gardens," and "Ant Nests in the Schoolroom." These titles indicate the scope of THE REVIEW, sample copies of which may be obtained by sending six cents in stamps to the publishers.

The Club's soirée season opened Dec. 16th, when Mr. Andrew Halkett lectured on "Animal Life in the Hudson Bay Region." Jan. 17th, Prof. Prince, Mr. A. P. Low and Mr. J. M. Macoun talked to the members of the Club on Mammals. Reports of these meetings will be published in the next number of THE NATURALIST.

NATURE STUDY—No. XX.

NATURE STUDY AT THE MACDONALD INSTITUTE.

By D. J. DOYLE, Guelph, Ont.

Perhaps no more important educational problem has been attempted in recent years than that which was presented in the Nature Study department of the Macdonald Institute at Guelph to the late Dr. W. H. Muldrew, whose unexpected death on Oct. 7th, 1904, at the very beginning of the first term in which a regular Nature Study class had been enrolled, has proved a serious loss not only to the Macdonald Institute, but to educational progress generally in Canada. Prof. Lochhead, who next assumed charge of the Nature Study department, setting to work with a definite aim, has ably carried forward the work of his predecessor.

Regarding the psychological value of the new study in the development of child intellect, there is, I think, a general measure of unanimity among educational workers. It is when we turn from this phase of the question to the necessity of the teacher's knowledge of Nature and the simpler elements of Science extending far beyond that of the child, in order that the efforts of the latter may be best stimulated and directed, that the first note of discord arises ; and we find our educators quietly taking sides. On the one hand are arrayed those who assert that a knowledge of child-nature is by all odds the primary requisite for the equipment of the teacher of Nature Study. On the other—and here are embattled the staff of the Macdonald Institute—stand those who believe that a knowledge of child-nature, while an element of very great importance in itself, must still yield precedence to a knowledge of that other nature which is to be met with in the out-of-doors, and upon the regular working of whose laws the welfare of the human race inevitably depends.

Imbued with this conviction, the staff early directed their efforts towards placing the students as much as possible in direct contact with Nature, and particularly with those objects and phenomena which lay readiest to hand. This was secured in two ways, (1) by field excursions, (2) by laboratory work and lectures. The field work proved in many ways perhaps the most instructive feature of the work at the Institute. Here for the first time were the students placed face to face with Nature. To the keen observer how much do the field and wood reveal on an autumn day? How seriously is he handicapped whose knowledge, brought to the interpretation of Nature, has been limited to the casual observances of a few leisure hours! The distant gleam of white on the alder bough, the flitting glimpse of a grey wing in the bush, the patch of green on the old beech trunk pass unheeded by under the eye of the nature amateur. But when under the direction of a skilful naturalist, the white upon the alder has been examined and reveals itself as a mass of fuzzy living aphids; when the peculiar squeaky bird-call has been sounded and the grey wing resolves into a nervous, shy, little ruby-crowned kinglet; when the patch of grey on the beech has revealed one of the many lichens, and one's laboratory practice tells him that this little mass of grey represents a life far down in the scale of plant development, then the fields and woods take on an added interest, and the simple and obscure claim equal rank with the gaudy and the beautiful.

The best methods of correlating the new Nature work with the old subjects on the curriculum was a matter demanding particular attention. For an illustration of recent earth history it was shown that no better spot could be selected than a gravel pit. Here the pupils may examine the shape and nature of the gravel-stones, the resemblences or differences between these stones and the bed rock, the arrangement of the layers of gravel, the dip of these layers, etc., showing the action of water. Subsequent lessons may include observations of the surrounding country, evidence of the action of ice or water, changes in the beds of lakes and rivers, etc., from which the pupils may deduce much of the past history of the locality. In history, a beginning may be made in the life of the district, its trustees, its forms of government, the township council, leading men and women of the township, stories of early settlement, etc. In literature certainly, a knowledge of nature is necessary for an understanding of the passages to be studied. Let the pupils go out to the meadows and observe the bobolink there before taking up such a selection as Bryant's "Robert of Lincoln." Only in this way can they appreciate the truth and structural adaptability of this little poem. In composition, descriptions of journeys in the fields and woods, of birds and trees and animals observed, may be found subjects on which the children will write interestingly and naturally. Taken altogether, Nature Study need not be considered a new subject, but rather as a vitalizer of the old.

Here also may properly be mentioned the lectures and field work in gardening conducted by Prof. Hutt, of the College staff. During a spring or summer term this work should be made to constitute one of the most important features of the course. But the nature of the weather this fall seriously interfered with the carrying out of any extensive field work. What was possible, however, was done. Following a series of lectures on the subject, advantage was taken of the first fine day to stake off, level, plant, and label a series of plots, each student having one in charge. The lateness of the season prevented the germination of the seeds, but this work was carried on within doors by means of germinating boxes and blotting pads, a series of drawings being made to illustrate the stages of development in the plants.

Roughly speaking, the work in the laboratory was divided into three parts: (1) an examination into the stages of plant evolution as revealed by the common algæ, fungi, lichens, mosses, ferns, etc., of the locality; (2) experiment in plant physiology, elementary physics, and organic chemistry; and (3) elementary entomology.

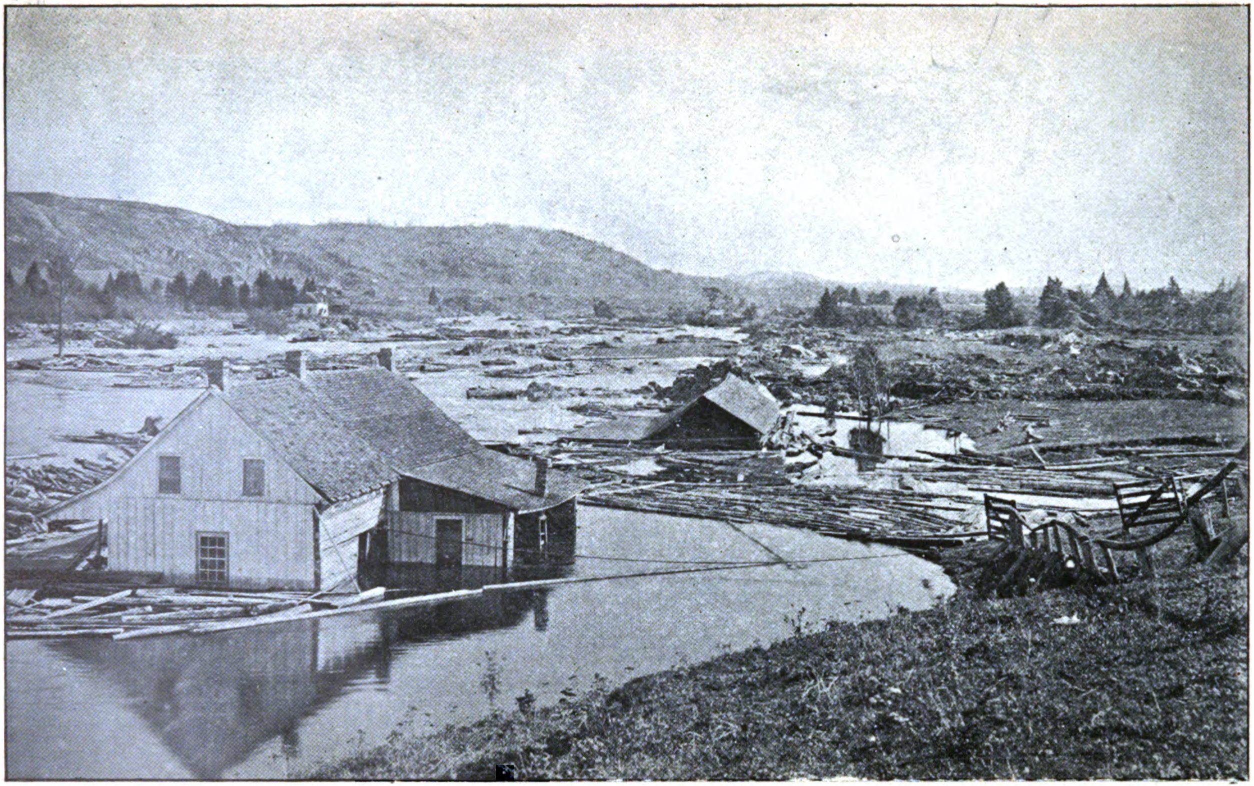
If to any subject, surely the old adage that "seeing is believing" is applicable to Nature Study. Here, if never before, the child must get rid of books and hearsay, and reach down to the very facts of Nature itself. The pictured object which some one else has seen and depicted, will not suffice here; much less the word description. The child must come in contact with the actual object and develop through his experiences with that. And yet, how much of the teaching of the past has practically been hearsay, those who have passed through our elementary and high schools within comparatively recent years can sadly testify

It was Plato, I believe, who instanced the position of a man who had grown to maturity in some dark place and then been brought suddenly forth to the light of day and the world of nature around him. He pictures the wonder of that man, his *realization* of the facts before him. He has not seen these things pictured in books and grown up with them. To him they are new, and real, and divine. In a somewhat similar position is the child who has grown up in personal contact with Nature. How does the crude sap in the soil rise in the stems of plants? The child knows it does rise, for he has seen the watery juice in the stems and leaves.

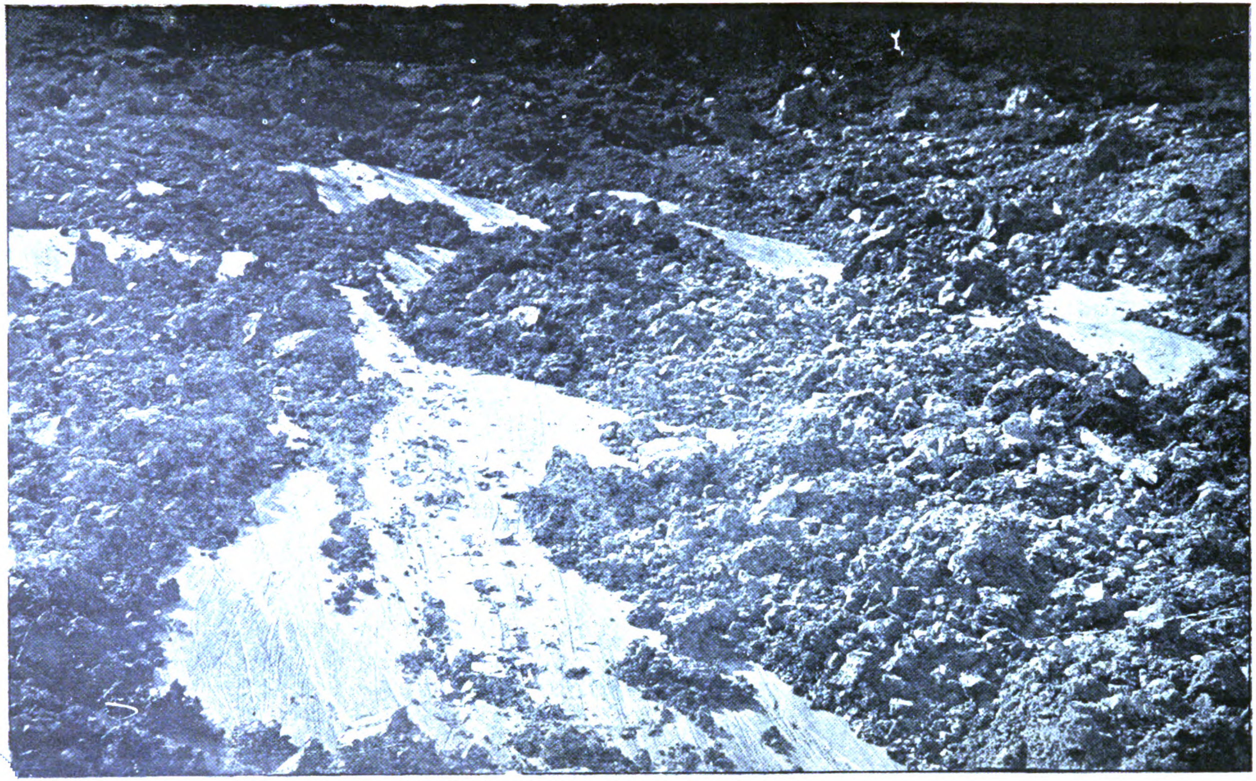
But how? Two simple laboratory experiments reveal the facts: (1) that given certain conditions, liquid will rise in a glass tube through an osmotic membrane, which may represent a root fibre, and (2) that colored liquid will rise in a cut stem placed with its end in the liquid, and further that, in rising, it follows certain, well defined passages. The child sees this before his eyes. It has become a real fact in his consciousness. He has had a new experience. And these are only a few of the many simple experiments by which a realization of the working of Nature may be brought home first hand to the pupil.

With younger pupils, no doubt these broad and pleasant stimuli which appeal to the æsthetic side of the child's nature must be largely depended upon for development of sense activity. But to the child whose years at school are limited, a practical knowledge of those features of Nature with which his life-work will be most closely connected is of many times the value. With this object in view, the attention of the class was directed towards the collection and study of weeds and weed seeds, and the rusts, smuts, and other parasitic growths which at times have proved so serious a menace to agricultural success. To this work were appended brief descriptions of the best methods of fighting these enemies of the farmer. The collection of specimens of injurious insects and their work, also placed the class in possession of much valuable information regarding another element of danger to the farmer's crop.

In the Manual Training department a successful attempt has been made at the correlation of Nature Study and woodwork, cardboard work, drawing, design, color work, and modelling. In the wood and cardboard work only such models have been selected as would prove of practical value in the Nature work, as, plant labels and garden stakes, spreading-boards, terraria, bird-houses, etc., in wood, and seed-boxes, etc., in cardboard. In drawing, no pencils were used, brushes taking their place. A beginning was made in blob work and moss drawing in ink. This was followed by color work, the construction of charts, drawing of objects in colors, and natural and conventional designing. Of this work perhaps the most important feature was the drawing of natural objects in colors. Anything—a bird, a butterfly, a twig—was selected and worked out with a brush in its natural colors. Prof. Evans, who has charge of the Manual Training department, advises the introduction of this work into even the lowest grades and its continuance throughout the School. In this way it is hoped we may be able to cut adrift from the conventional, expressionless drawing work of the past, and do something towards the development of those artistic instincts which have hitherto been left dormant in the child. Poets may be born, but artists must be developed.



View looking down (east) Lièvre river from McMillan's house, showing submerged portion of the flat caused by the damming up of the river by the material from the landslide.



The gliding plane of clay striated by the gravel contained in the bottom of the moving mass of supersaturated clay.

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CANINE INTELLIGENCE.

By SIR JAMES GRANT.

THE JUDGE AND THE DOG.

What a peculiar animal the dog is ! How full of instinct, in fact almost approaching common sense, or uncommon sense, if it might so be termed. There is so much in the very expression of his face, the cock of his ear, the grin of his mouth, the wag of his tail and the occasional oblique attitude of his body, all making up in a most unmistakable way, for the absence of speech, so often uttered by a bark. Is it any wonder the dog takes so important a place in almost every household ? He is far more than ornamental, he is useful, and his characteristics, studied out, even in a moderate way, demonstrate beyond a doubt, how much there is in this type of the quadruped species. Now and then in this section of Canada we have a real dog show, and for variety and peculiarities of dogs, the wonder is, how so many strange dogs found their way so near the north pole. In the discharge of my professional duties, I have often been amazed at the sense exhibited by dogs, particularly in the way of observing the sick of the household. Recently, a little Scotch terrier, one of the small, well cut and shaggy-haired kind,—the little fellow that looks under his long hairy eyebrows, as if he knew more than any other of his class—attracted my attention. This little canine held his own position in the household with great coolness and dignity. When any stranger called, he generally observed the surroundings in his own peculiar way, and just in accordance with his impressions, he would growl as if not perfectly satisfied, or take a good look and walk off quickly to his usual quarters, fully satisfied nothing in particular would happen. The proprietor of the house, a judge of high standing, had been ill for some months, during all of which time the little terrier was a great comfort and source of pleasure. Wherever his master changed his place there also the little dog was to be found. He noted every action, and no matter how many called, or what the company was, behind, or under his seat or on the mat near his feet, the little canine proved beyond a doubt his faithful character, and almost actual knowledge that his master was not in his usual health and spirits. For some time the physician had not paid much attention to the little canine, who apparently was not to be passed over in a casual manner. One day, when making the usual call, the small dog was actually on the sidewalk evidently on the look-out for the particular friend of his master. No sooner had the physician arrived than the dog began his usual gyrations, evidently greatly delighted at the prospect, and followed him to the bedside of his master. There he took his position, first looking at the doctor and then at the sick man, as if quite aware something was wrong. As things moved lively he was on the alert, but when all was quiet and dull he remained much the same. This state of affairs passed on for some weeks, and the certainly instinctive actions of the little terrier could not but be observed. After a long and trying illness the patient passed away. Some days afterwards, the family physician called to pay a friendly visit. The dog was there, but much changed in character. No longer active and energetic as formerly but rather quiet and indifferent, he took his position on a rug near at hand and turned his back on the visitors, evidently not wishing to attract attention, as his chief source of pleasure was gone, and the familiar voice was hushed forever. The actions of these little animals, so strange and peculiar, are evidence of mental power, difficult to define and sufficient to make us cherish their actions, indicative of rare attachments and canine sympathy.

MEETING OF THE ENTOMOLOGICAL BRANCH.

Meeting No. 19, held at Mr. Gibson's rooms on January 19th, 1905; nine present. The chair was taken by Mr. Arthur Gibson, who stated that the proceedings this year would be of the same nature as heretofore, viz., that each member would be called on in turn, and he trusted that all would endeavor to bring something to exhibit, or some note to read at each meeting of the Branch. In the past this plan had proved so successful that he considered it probably the best way of keeping up the interest. Every actually observed fact was of value, however simple and unimportant it might seem to the observer who made it. Accordingly he called upon every one present in turn and a most instructive evening was passed.

Mr. W. Metcalfe showed a collection of about 100 specimens of all orders which had been collected by him when carrying on his own investigations among the small Heteroptera. His material in his own specialty was not yet sufficiently in order to bring before the Branch, and he asked Dr. Fletcher to speak of any of the specimens in the other orders which seemed worthy of mention. Several rare specimens of flies, beetles and sawflies were then exhibited and short statements made concerning each.

Mr. Norman Criddle, one of our memhers, from Aweme, Man., described the physical nature of that part of Manitoba where he lived and pointed out the exceptionally suitable character of the locality for collecting insects and plants. He also showed an interesting series of Tiger beetles taken on the drifting sand of an extensive tract of sand hills lying south of Douglas on the C.P.R., and about 12 miles east of Aweme. These specimens included the beautiful local variety of *Cicindela formosa*, which has received the varietal name of *Manitoba*, Leng ; *C. venusta*, *C. purpurea*, var. *limbalis*, *C. punctulata*, and the two very interesting sand-loving species *C. lepida* and *C. limbata*. These two latter are extremely rare in collections, being found on the sea coast and on similar sandy tracts to the one above mentioned, in Kansas and Nebraska. Other striking insects shown by Mr. Criddle were a curious rove beetle named *Xenodusa montana*, var. *hirsuta*, which lives in nests of ants ; a large and strong ground beetle, *Pasimachus elongatus*, and a specimen of the Rocky Mountain Locust, *Melanoplus spretus*, which occasionally has done harm in Manitoba and the North-west, but which has not been seen for a year or two.

Mr. C. H. Young showed a most exquisite collection of microlepidoptera (about three hundred specimens) which had been taken during the past summer at Meach Lake, Que., and around Ottawa. All the members present were delighted with the beautiful and neat way in which these specimens were set and labelled. Many of the specimens had been reared by Mr. Young from larvæ, and records kept of their food plants.

Mr. W. J. Wilson submitted an interesting small collection of insects taken on the Hudson Bay slope during the past season. He stated that the season had been an exceptionally poor one for all kinds of insects, except perhaps for mosquitoes.

Mr. Andrew Halkett read some interesting notes made in the Arctic regions as Naturalist of the Neptune Expedition, under Mr. A. P. Low. The large larvæ of the Bot Fly of the Cariboo were shown, and a description was given of the way in which these repulsive creatures occur in the backs of the cariboo. They are oval in shape, over an inch in length and about half an inch in width. The body is covered with short spines, and the creatures must be the cause of great suffering to the animals while they are present beneath the skin. When mature they force their way out through a hole in the skin, in a similar way to the warbles seen on the backs of cattle, and fall to the ground. Later, the mature fly, *Œdemogena tarandi*, L., appears. It is a hairy fly three-quarters of an inch in length, of a yellowish colour, bearing a black band across the middle of the thorax, connecting the bases of the wings. The abdomen is yellow at base but has two-thirds at the tip reddish-brown. This insect Mr. Halkett spoke of as the "Tooktoo Fly," which he named from the Esquimaux word for the cariboo. Parasites from the walrus and seal were also shown, as well as some beetles and caddice flies.

Mr. D. A. Campbell showed some eggs, and larvæ in the first stage, of the Cecropia moth, pointing out that the piliferous tubercles were of a different nature in the different stages.

Mr. J. W. Baldwin showed a series of the Meadow Brown butterfly (*Satyrus nephele*), which illustrated the exceeding variability of markings in this species. A bottle containing living specimens of small ground beetles which he had collected in the autumn and had kept alive through the winter was also exhibited.

Dr. Fletcher showed specimens of two imported cockroaches, *Panchlora viridis*, a beautiful apple-green species, which had been found at several places in Canada during the past season. Specimens had been taken by Mr. C. Stevenson, in Montreal, by Mr. Baldwin in Ottawa, by Miss Dorothy Coates in Winnipeg, and by Mr. J. W. Cockle at Kalso, B.C. The species is a native of the West Indies, and had, probably, in all instances, been imported in bunches of bananas. Another large species found by Mr. C. Stevenson, in Montreal, *Periplaneta australasiæ*, has also lately turned up in numbers in Philadelphia. An extract was read from a letter by Dr. Henry Skinner, just received, in which he quotes from a correspondent, as follows: "I had a lot of living insects sent me yesterday. They are in the greenhouse of one of the members of the Pennsylvania Horticultural Society, and are devouring everything from an orchid to an overcoat." Some remarkable oak galls from California gave an opportunity for speaking of the work of these insects. Specimens of the Browntail moth from Massachusetts were shown in all stages of the insect. A single specimen of this moth was taken in St. John, N.B., in 1902, by Mr. W. McIntosh, but no further occurrence in Canada has been reported. It is now causing great concern by its rapid increase in Massachusetts.

Mr. Arthur Gibson showed specimens and spoke on the cosmopolitan occurrence of the granary weevils. The best remedies for preventing injury and destroying the beetles in infested grain were described. The Columbine borer (*Papaipema purpurifascia*) in all stages was shown, and an account given of injury done by the larvæ in beds of columbine at the Experimental Farm. Some well-made inflates of the larvæ of some sphinx moths were also shown by Mr. Gibson and were much admired by all present.

The Chairman drew the attention of the members to the beautiful report by Prof. E. P. Felt, State Entomologist of New York, recently issued on the Mosquitoes or Culicidæ of New York State.

J. F., for Sec.

BOTANICAL BRANCH.

The second meeting of the Botanical Branch was held at the residence of Mr. J. M. Macoun, Thursday evening, Nov. 18th, when the following members were present: Messrs. Fletcher, Attwood, John Macoun, Blackadar, Edward Cameron, Roy Cameron, R. B. Whyte, W. T. Macoun, T. E. Clarke, Carter, St. Jacques, Clarke, Ami and J. M. Macoun.

The discussion on "Individuality in Plants" was resumed and a letter was read from Prof. D. F. MacDougal, of the New York Botanical Garden, in which he stated that certain points connected with mutants and hybrids seem to be well established. These are:

"1. No systematist who has seriously examined the mutants of Lamarck's evening primrose, in the adult stage, has decided them to be otherwise than species and varieties in accordance with the estimate placed upon them by de Vries.

"2. Lamarck's evening primrose does not vary widely, not so widely as some of the mutants, as has been found by statistical methods. The mutants do not intergrade with each other or with the parental form as shown by series of measurements.

"3. The common evening primrose does not vary as widely as it is reputed to do, as has been found by cultural studies: doubtless closely related species have been confused with it, which has led to much misapprehension in the matter.

"4. Mutants have been seen to arise from Lamarck's evening primrose in my own cultures under circumstances that admitted of but one interpretation, and historical investigations show that this species is eligible as research material in every way.

"5. The entire obliteration of the evening primroses and all records concerning them would still leave ample evidence that new qualities arise suddenly or by mutation and that new species owe their origin to changes of this kind. It can not be proven of course that all species arise in this manner, and very probably they do not, as for instance, the species that have been formed by natural hybridizations."

In Prof. MacDougal's paper on "The Origin of Species by Mutation," he cites *Chelidonium laciniatum* as an example of a species which apparently originated accidentally. He says: "Sprengler, an apothecary in Heidleberg, discovered in his medicinal garden in which *Chelidonium majus* was cultivated a new form of *Chelidonium* with divided leaves and laciniate petals. .... The new species was found to be self-sustaining and in repeated cultural tests has shown no tendency to revert to *C. majus*."

During the discussion Mr. W. T. Macoun stated that among seeds of *C. laciniatum* received from Upsala and grown at the Experimental Farm, only twenty per cent. had proved to be that species, the remainder being *C. majus*. It is, of course, possible that the seed may have been mixed, but if not, this disposes of *C. laciniatum* as a species. Further tests will be made at the Experimental Farm from their own seed.

One of the members having suggested that the fact that the Early Rose and some other varieties of potatoes no longer ripened seeds was an evidence that these varieties were degenerating, it was brought out in discussion that the reverse was the case. The energy which formerly was required to mature the seed now went to increase the size and number of the tubers. Mr. W. T. Macoun expressed the opinion that if by spraying and watering growing potatoes could be carried past the time when the stalks usually dry up a greatly increased crop would be the result as this would give an opportunity for the small tubers to grow and ripen.

A description of an interesting experiment on the vitality of the common buttercup was given by Dr. Ami, details of which appeared in the December number of THE NATURALIST.

The third of the series of meetings in connection with the Botanical Branch of the Club was held at the residence of Mr. H. M. Ami on the evening of Dec. 6th, 1904. There were present Messrs. John Macoun, W. T. Macoun, R. B. Whyte, A. E. Attwood, D. A. Campbell, T. E. Clarke, H. St. Jacques, and Roy Cameron. Mr. E. Stewart, of the Forestry Branch of the Department of the Interior, and Mr. Hamilton, of the Exhibition Division of the Department of Agriculture, were present as guests.

The topic chosen by the chairman for discussion was "Conifers," and he introduced the subject with a brief paper on "A typical young pine forest growing at Ironsides, near Ottawa," where conditions prevail which afford an excellent opportunity for members of the Botanical Branch of the Club to study not only pine-life, but also the growth of trees generally. There are poplars, birches, maple and pine trees, growing together in a young forest which began to sprout after the fire of 1870 which cleared the whole region for miles, and laid bare, owing to erosion of the underlying clay deposits, several thousand acres of land on which not a blade of grass could be seen. The following notes on the forest, which can be seen there at the present time, are herewith given.

"After the big bush-fire of 1870, which swept over a large portion of the Ottawa valley and laid waste large areas of good and bad timber lands, there followed the consequent erosion and denudation of the country. The timber-laden district of Ironsides, between Ottawa and Old Chelsea, had been totally destroyed by fire, leaving on the ground nothing but the bare burnt clay, together with a few large trunks of the gigantic pines of this neighbourhood, which attested to the great destroyer of plant-life and the once thriving forest. Lumber camps had come and gone. Man had cut the best for himself, leaving only the smaller scrub behind, and a few others spared by the axeman.

"Presently, not even the trunks of the trees were seen standing or fallen, throughout the burnt areas, for the erosive agencies soon began their powerful operations, whilst vegetation, which usually acts as a deterrent to the progress of waters from rain in reaching the nearest streams, was no longer there.

"Rain having acted upon the unctuous clay deposits, the fine materials of which it is composed were soon carried down to the lower levels in the nearest brooks, and a clean, bluish-gray clay surface, well-washed and presenting a destitute and barren piece of country followed.

"Not a blade of grass could be seen for miles. This state of affairs continued for a couple of years, during which the waters of the district carved out the strata, and carried off much of the soil and clay of the disrict. Deep valleys were excavated, trunks of trees, and other remains of vegetation, etc., were carried away and buried in the sediments of this period down the Gatineau or Ottawa.

"Nature is always busy, and as soon as there came a slight lull in the process of denudation, she sent forth her redeeming forces and employed them in restoring, reconstructing and maintaining the equilibrium by sowing seeds of various grasses, shrubs, trees and other kinds of plants from this well-known prolific district, and soon the blue-gray clay mass and tints began to disappear and assume a green appearance. Denudation and reforestration had a struggle. The former had won outright at the outset, but now it was the birth of a new forest, and it was also the turn of plant-life to flourish and spread its beneficent mantle over the land.

"To-day there may be seen in the same district a dense young forest of soft and hard-wood trees, with the usual associates of the forest in the form of shrubs, flowers and grasses, sedges, mosses, etc. The humblest of these are, perhaps, the greatest protectors to our forests. They keep back the rush of the waters in periods of flood and rainstorm. In the Ironsides district to-day we have a young pine forest which is apparently growing to the best advantage for the production of fine pine timber in the not distant future.

"What are the conditions prevailing? Along with the young pines there may be seen growing in luxuriant form, poplar trees (*P. grandidentata*, *P. tremuloides* and *P. balsamifera*), also birches and maple trees, amongst which we have *Acer rubrum*, whose gorgeous tints of autumn time afford such glorious pictures to the view of the city folk from Parliament Hill. As is well known, poplars grow much faster than pine trees. A visit to the locality will show you a young pine-tree practically surrounded by other trees, chiefly poplar. The poplars are taller than the pines, and are likely to maintain their supremacy for some years to come. As long as the poplar-trees keep growing taller, and in the growing period of the year over-top the pines, we find that the lower branches of the pine-trees will be stifled or become more or less abortive, owing to the density of the foliage surrounding the trunk of the pine-tree. By the time that the poplar-tree reaches its maximum height, the branches of the pine-tree will be mere twigs This will give the pine-tree a trunk free from knots, and form merchantable timber of the greatest value. The instant the poplar-tree stops growing taller, the pine-tree in turn shoots upward and out from the mass of foliage below, and soon towers above the poplars till it reaches its maximum height—three or four times that of the poplar. Then the life of the poplar begins to decline, the trunk decays, its branches break and fall, whilst insect-life comes in to accelerate its doom. The pine-tree, in the course of a few years, begins to spread an umbrella-like shade over the dying poplar, to hasten the final crisis, which the winds of summer or storm soon bring about. Then the monarch of the Eastern Canadian forest is king, and rules.

"I imagine that there are few places on this continent where a study of pine-life can be carried on to greater advantage than in our immediate vicinity at Ironsides, Que. I had an opportunity this fall (September, 1904) of visiting Woodstock, Vermont, where Yale students of forestry have an excellent opportunity to study young forests.

"I have no hesitation in saying that it would be most interesting to have yearly records of the life-history of some of the individual trees of the Ironsides district, in order to ascertain the normal as well as the best conditions which must prevail in order to form fine timber trees, whether pine, spruce or poplar, or even hardwood. Whether it would be advisable to reserve just such a piece of country which thirty-four years ago was as bare of vegetation as a billiard-ball or an egg, is a question which it may be worth while for the Government to consider.

"I have recently heard of a Canadian pine and conifer forest growing in Germany which was seeded sixty years ago and is now flourishing. Baron Fuerstenberg's father it was who planted the seeds of Canadian conifers in Gammertingen, Germany, these long years since, and I have learned that they now have a forest worth while cutting. It would be interesting to ascertain the quality and quantity of lumber that can be cut from these trees.

"I would strongly advise anyone wishing to see a young pine forest, to visit the thick woods of Ironsides, along the line of the Canadian Pacific Railway between Ironsides station and Chelsea, within the 'Ottawa District.'

"H. M. AMI.

"Ottawa, Dec. 6th, 1904."

DISCUSSION.

In the discussion which followed, Mr. W. T. Macoun described the results of the experiments in tree-planting made at the Central Experimental Farm in Ottawa since 1887. Here a forest of the Scotch pine grows well. Several plantations of white pine also had been made in three different ways : five feet apart, ten feet apart, and with mixed trees. He remarked that shade killed pine trees. Prof. Macoun remarked that poplar and birch were the scrub in which pine delighted to grow. Poplars and birches came and died, then the pines and elms survived and flourished. He reiterated a statement made by him before the Forestry Conference in Toronto, in 1903, to the effect that pine trees grew from the seeds which came up out of the ground where the squirrels and other small mammals had stored them. White pine grew from decaying logs for the most part. Mr. Hamilton stated that at the River Désert, up the Gatineau, in 1874, four years after the big fire, he saw poplars growing, and seventeen years after the pine trees were one foot thick at the stump. He believed that trees flourished best when thickly planted. He had noted the fact that pine trees growing in light soil had lighter colored leaves than those grown in richer and darker loam. Mr. Stewart pointed out that broad-leaved trees and other forest weeds killed smaller pines. Mr. W. T. Macoun further remarked that during an outing last fall with Mr. Elwes, of England, an enthusiastic forester, when a traverse was made from Kingsmere to the Gatineau river, through the forest, they had noticed young pine trees growing almost invariably upon the decaying trunks of fallen trees. He believed that the Scotch pine would thrive in America, and in our Northwest especially would be a welcome grower. Seedlings of the Scotch pine (*Pinus sylvestris*) grown in Canada at the Central Experimental Farm had already been planted. There were three Old Country trees in Canada doing very well, namely, the Scotch pine, the Norway spruce, and the European larch.

Among the specimens exhibited were *P. inops* from the New Jersey barrens, and *P. Tæda* from Georgia.

THE THREE SPRUCES.

Mr. W. T. Macoun then spoke on the three spruces, *Picea rubra*, *P. nigra* and *P. alba.* The first grew in the east only, while the other two grew from Prince Edward Island to the Rockies. Black spruce grew in damp and wet places ; white spruce grew best on the margins of swamps or edges of moist land; whilst red spruce grew on farms on high lands. He exhibited specimens of eleven spruces growing at the Central Experimental Farm, amongst which we note : *P. Omorica*, *P. orientalis*, *P. excelsa*, *P. Engelmani*, *P. obovata*, *P. Sitchensis*, *P. pungens*, *P. Alcockiana*, besides fine examples of the three Canadian spruces, black, white and red. Mr. Macoun pointed out the differences which existed between the various species shown, as well as their resemblances.

Prof. Macoun pointed out, and Mr. Stewart supported him in the view, that the black spruce (so-called) of commerce in New

Brunswick was *red* spruce proper (*P. rubra*). Mr. Stewart enquired if it was known that black spruce grew any merchantable size anywhere. No one had ever heard of black spruce making merhantable wood.

Prof. Macoun had collected the three spruces at Eastman's Springs, near the Mer Bleue. In the latter bog the black spruce was common. He had noted a *law* in the fruiting of spruces, namely, that white spruce always had the top cones on the tips of the branches hanging down; red spruce had them half-way down; whilst black spruce had its cones close to the trunk, and these stay on for ten years, and even over twenty years. White spruce lose their cones soonest, red next. You will generally find the cones of the white spruce tree on the ground. Pollination in spruces was also discussed by Prof. Macoun. He stated that whereas the tops of spruce trees were often crowded with cones, as much as a bushel at the very top, the lower limbs of the tree were covered with pollen.

Regarding the character of colour of the wood of the spruces, it was noted that the wood of the white spruce was white, that of the black spruce more resinous and hence darker, while the colour of the wood of the red spruce was very near that of the black, hence the term "black spruce" given to red spruce in New Brunswick and elsewhere. In the discussion, Messrs. Campbell, Clarke, Attwood and others took part. Through the kindness of Prof. D. P. Penhallow, of the Botanical Laboratory of McGill University, Montreal, Mr. Ami was able to show, with the aid of the microscope, thin sections of the three spruces discussed durigg the evening. Microscopical sections revealed the structure of wood beautifully, and marked differences were observed. The microscopical test was always crucial and proved most satisfactory.

WHAT IS NATURE STUDY?

Putting the definition of the Nature Study movement in one concrete sentence, I should state it as follows: "The Nature Study movement is the outgrowth of an effort to put the child into contact and sympathy with its own life."

L. H. BAILEY, Ithaca, N.Y.

NATURE STUDY—No. XXI.

NATURE STUDY IN THE SCHOOLS OF NOVA SCOTIA.

(A Historical Sketch.)

By DR. A. H. MACKAY, Superintendent of Education for Nova Scotia, Halifax, N.S.

A systematic course of oral and objective study was outlined in the first conspectus of a course for the schools of the province, which was presented to the Provincial Educational Association at Truro on the 14th day of July, 1880, by the Principal at that time of the public schools and Academy at Pictou. This was done on the invitation of Dr. David Allison, then Superintendent of Education for the province. After due discussion the conspectus was referred to a committee for simplification and presentation at the convention held the next year, where it was further discussed and passed, practically in the form in which it was soon after prescribed by the Council of Public Instruction for the first eight grades of the public school system, known as the common school grades, in the year 1881.

In 1887 "The Educational Review," which has ever since been continuously published at St. John, N.B., was started with the object of developing the Nature Study side of the course, as well as serving incidentally as a teachers' organ for the Atlantic provinces of Canada. Illustrated lessons on natural objects were prepared, the most continuous being the series under the title "Ferndale School." The whole environment of common school life was more or less covered, instruction for teachers on various subjects, including even the evening sky, which was illustrated by a series of star maps. The Ferndale series dealt with the biological side mainly; but other pages covered mineralogy, physical phenomena of common range, and so forth, before any general effort appears to have been made in the educational press of the other provinces of Canada.

A little later, 1901, a Science building was erected in connection with the Provincial Normal School; and the Provincial School of Agriculture founded by the Government a few years earlier, was then more completely affiliated with it. An extra course of two years in the sciences underlying the art of agriculture was given to teachers who could take this extra time, for which a special diploma and prize were awarded, and an additional provincial grant of $100 when they were engaged in teaching in an efficient rural school. This idea has been carried out in a fuller manner by Dr. James W. Robertson, director of the Sir William C. Macdonald Rural School Fund, when $175,000 were donated to build the Macdonald Institute of Nature Study, etc., at Guelph, in Ontario, and additional funds were provided for Nature Study teachers and school garden demonstrations.

For about twenty-four years the idea has been in the public course of study, developing gradually from morphological to biological observation—from the observation of forms to the observation of action. For a number of years records have been made of the biological and meteorological facts capable of being accurately observed by pupils and verified by teachers, such as the dates of first flowering, leafing and fruiting of plants ; the migration of birds ; thunderstorms, frosts, high and low water, etc. These have proven so valuable as scientific records, that for some years they have been annually compiled into averages for the different regions of the province as well as for the whole province. The schedules have to some extent been utilized in the other provinces of Canada, and a similar system has been introduced in imitation of it into some of the schools of Denmark. The main object of the scheme originally was to give some objective work to the pupils on their way to and from school, to be reported to the teacher in school. These schedules are being carefully bound up into annual volumes, for the benefit of future students of climatic and ecological conditions in the province.

In the provincial course of study special directions are given for each of the eight grades of the common schools. The general directions published in each school register give in brief form the substance of the *special* directions published annually in the "Journal of Education," which is the official bulletin of the Department, sent free twice a year, in April and October, to each school board in the province. These general directions, which indicate the view taken by the Nova Scotia Education Department of the character and importance of this elementary work in the public schools, are as follows :

"NATURE STUDY.—The noting, examination and study of the common and more important natural objects and laws of Nature as they are exemplified within the range of the school section or of the pupils' observation. Under this head, pupils should not be required to memorize notes or facts which they have not, at least to some extent, actually observed or verified for themselves. Many books on the list recommended for school libraries (see October "Journal," 1903) are useful guides to the teacher for portions of the work prescribed in some of the grades. There should be a short "Nature Lesson" given every day on the daily collections and observations of the pupils themselves—not on the statement of teachers or books—the lesson always being based on the objects or observations. These guide books are to be used only to show the teachers how to give such lessons. They are entirely prohibited as text-books for either pupil or teacher, for under no circumstances should 'notes' from the books be given to pupils. All such studies must be from the objects. Observations under this head form some of the best subjects for English composition or drawing exercises in all grades.

"In schools with pupils of several grades under one teacher (as in most rural schools), many of these lessons may profitably engage the whole school. In nearly all, either the whole senior or whole junior divisions of the school can take part. A skilful teacher can thus give profitable object lessons to several grades of scholars at once; at one time giving a Grade V lesson, at another time a Grade VI or Grade VII or Grade VIII lesson, which will also contain enough for the observation and interest of Grade I, Grade II, Grade III and Grade IV pupils. An object lesson given to the highest class can thus, to a certain extent, be made a good object lesson for all the lower classes. The older pupils will see more and think more."

"It must be remembered that the memorizing of notes and facts merely stated to pupils is strictly forbidden under this head. Such memorizing is pure cram, and is injurious instead of being useful. The teacher may not have time to take up in class every object indicated in the Nature lessons of the course. In such cases the pupils should be given two or three objects nearly related to the typical specimen examined in school, with directions to search for and examine them at home, as illustrated in the specimen class lesson. Without much expenditure of time the teacher can note that this work has been honestly attempted to be done by each pupil. The lessons must be direct from Nature itself, but under the guidance of the teacher, who can save time in bringing the pupils to the point desired by his more matured experience. They are intended to train the observing and inductive faculties, to show the true way of discovering something of the nature of the world which immediately surrounds us and which is and will continue to be reacting upon us in one manner or another. This knowledge is so much power over Nature, from which we have to win our material existence. It is also essential as an element in any true and useful system of philosophy.

"More stress has been laid here on the natural history of each section than on elementary physics and chemistry. Not because physical phenomena are less important; but because the the elements of these sciences are the same all the world over, and there is no end to the cheap and well illustrated guides to practical work in them which will well suit a section in Nova Scotia as well as one in England or in the United States. But there are no such simple guides in the biology of each section, nor in many others of its scientific characters. The teacher, then, must become a student and master himself; for such exercises have special power in developing the habit of accurate observation (which is the soundest basis for any career, ranging from that of the poet and professional man to the tiller and lord of the soil, the tradesman, the manufacturer, the inventor) and in developing in connection with history and civics an intelligent attachment to both the material and ideal features of our country."

These quotations are from the official instructions published annually for a number of years. They will in future be still further modified, it may be assumed, so as to utilize the ideas and principles now being developed in so many countries, many of which have been so effectively set forth in THE OTTAWA NATURALIST series of articles.

THE OTTAWA NATURALIST.

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PRESIDENT'S ADDRESS.

W. T. MACOUN.

Members of the Ottawa Field-Naturalists' Club, Ladies and Gentlemen :—

About this time last year we celebrated the 25th anniversary of the organization of the Ottawa Field-Naturalists' Club, and it was with feelings of gratification that many of the original members of the Club came together and told of the work which had been accomplished by the Club during the past twenty-five years. Another year has gone since then and the Club has entered upon its second quarter century ; let us hope that there will be continued progress in the study of Nature in the Ottawa district, and that we shall realize even more than we have done in the past, what a broad field of work there is, and how little is yet known in the wonderful realm of Nature which lies about us. We can, however, look back over the past year's work with some satisfaction and feel that there is still a bright future for the Club. Although planned by last year's Council, the first work of this year was the evening devoted to Practical Demonstrations of How to Collect and Preserve Natural History Specimens, on April 5th, 1904. This proved very successful. The meeting was well attended, the demonstrations were good, and the numerous questions which were asked showed that this was a popular way of teaching Natural History and of interesting people in the study of it. It is expected that this will be repeated, in some respects at least, next spring.

During the spring, summer and autumn three general excursions were held and six sub-excursions. References have been made to some of these in THE OTTAWA NATURALIST, and fuller particulars regarding them will be given in the Annual Report of the Council. While at these excursions there is not very much new work done, it is felt that their principal value is in the assistance which the leaders of the Club are able to give at these times to those who are beginning the study of Natural Science and to the delightful outing which they afford to those who, perhaps, may be induced by seeing the enthusiasm of others, and the many attractions which the study of Natural History affords, to investigate for themselves, and thus develop a love for such work.

The Botanical Branch of the Club, which last winter held so many successful meetings at the homes of the members, has begun work this winter with much enthusiasm, and those who attend these meetings feel that in no way can Natural History be studied so well as among a small band of enthusiasts, each with his own views on certain questions and eager to give expression to them. The Entomological Branch will shortly resume its meetings also, and it is hoped that the Ornithologists will soon organize.

There has probably never been a more popular, and at the same time a more valuable, volume of THE OTTAWA NATURALIST than that of the current year. There has been a number of bright articles which have attracted the attention of members who do not always read THE NATURALIST carefully. The series of Nature Study articles continues to be of a very high order, and it is hoped that more members of the Club will take advantage of the pages devoted to Nature Study to give expression to their enthusiasm. There must be many members of the Club who are just bubbling over with good things, if they would only present them. The Editor of THE NATURALIST informs me that he finds it very difficult to get material for THE NATURALIST from local members, and if outsiders did not appreciate the advantages of publishing articles in THE NATURALIST he would be very short of material. Let us try and do better in the future. All lovers of Nature should be able to contribute something from personal observation that would be interesting and useful to others.

We invite you to study the Programme of Soirées for this winter. A change has been made this year in the charncter of the programme, and the meetings will be more informal than they have been for some years. It is believed that greater good will be accomplished by giving more time for general discussion. A glance at the subjects which are to be discussed and the men who will present them is sufficient to show what is in store for the members of the Club this winter.

I desire to express on behalf of the Club our feelings of appreciation for the use of the rooms at the Normal School and for the courtesy shown by Principal White.

It is with feelings of deep regret that we have to record the loss of a member of the Ottawa Field-Naturalists' Club who was always during the last twenty-two years of her lifetime one of the Club's most valued and best friends. I refer to Miss A. M. Harmon, whose sad death startled us not many weeks ago. If there was ever one who felt the thrill which Nature gives at times to those who know and feel her charms, Miss Harmon was one. She was one of the most faithful members of the Club, and attended regularly its excursions, soirées and annual meetings. The members of the Club will miss her kindly face this winter, and I am sure will trust that her love for Nature is expanding in that broader field beyond the grave.

Ladies and gentlemen, members of the Ottawa Field-Naturalists' Club, I anticipate a most enjoyable and profitable series of meetings this winter.

NEW BRITISH COLUMBIAN ROSACEÆ.

By EDW. L. GREENE.

MALUS MACOUNII. Tree, 20 feet high, four inches in diameter : leaves ample, rather thin, oval, mostly obtuse, from slightly to conspicuously 3-lobed, 2 to 3½ inches long, 1½ to 2½ inches wide, sharply serrate, glabrous on both faces even when young : pedicels nearly glabrous and exterior of calyx wholly so, only the inner face of the acutely triangular reflexed lobes tomentulose : corolla, large, white : fruit not seen.

Margin of Chilliwack Lake, B.C., 7 and 13 July, Mr. J. M. Macoun. Thoroughly distinct from *M. rivularis* by its broad obtusish thin glabrous 3-lobed foliage, and equally peculiar pedicels and calyx.

FRAGARIA LATIUSCULA. Low and not slender, the parts rather firm, peduncles 3 to 6 inches high, the leaves nearly as long, both peduncles and petioles villous with spreading hairs : leaflets pale, glaucescent and almost glabrous above, glaucous and pilose-pubescent beneath : leaflets in the largest leaves not very dissimilar, all on uncommonly long petiolules, very broadly cuneate-obovate, 1 to 1¾ inches long and nearly as broad, those of smaller earlier leaves even broader than long, all coarsely, deeply and evenly crenate : calyx-segments quadrate-oblong, very acute, the elliptic bracteoles quite as long : corolla ¾ inch broad, the petals mostly broader than long and overlapping : achenes large, superficial.

Chilliwack Valley, also by Mr. Macoun, 1891; 34,337, 34,338 and 34,339 of the Geological Survey collection.

FRAGARIA RETRORSA. Slender, soft and delicate woodland plant 6 or 8 inches high ; petioles, peduncles and pedicels retrorsely long-villous : leaflets light-green above and with few scattered hairs, underneath pale and glaucescent as well as more hairy, especially along the fine whitish veins, the middle one rather acutely obovate-rhomboidal, 1 or 2 inches long, the laterals similar but oblique, the teeth of all minutely cuspidate-apiculate : calyx-segments almost caudately acuminate : corolla small for plant, about ¾ inch wide; petals round-obovate, not overlapping, dull white, turning red in drying : fruits large, subglobose : achenes superficial.

Collected in the Chilliwack Valley 1901 by Mr. J. M. Macoun and distributed under Geol. Surv. No. 34,336. No. 34,335 may be specifically the same, but in this the pubescence is scanty and scarcely retrorse ; but if habit, foliage and flowers offer here the essential marks of a species, the two numbers must bear the same specific name.

SOME OF THE RARER PLANTS OF WELLINGTON COUNTY, ONT.

Collected by A. B. KLUGH.

AZPHRODIUM BOOTTII. Very rare. One plant only found, in a cedar swamp near Guelph, Ont. June 28, 1903.

ASPLENIUM VIRIDIS. Rare. Moist mossy rocks near Guelph, July 6, 1903.

MUHLENBERGIA SYLVATICA. Common in places along the River Speed, near Guelph.

SPOROBOLUS VAGINÆFLORUS. Abundant along roadsides throughout the southern half of Wellington Co.

ARRHENATHERUM AVENACEUM. Roadsides south of Guelph.

POA ALSODES. Fairly common in woods south of Guelph. This is not the type of *alsodes* but a glabrous-glumed form with few and long branches, thus somewhat approaching *P. debilis*, but distinguished from that species by the very acute flowering glumes and the longer and broader leaves.

PUCCINELLIA DISTANS. Along roadsides south of Guelph.

AGROPYRUM CANINUM. Common in some thickets south of Guelph.

ARETHUSA BULBOSA. Fairly common in an open bog south of Guelph.

ORCHIS ROTUNDIFOLIA. Frequent in a bog south of Guelph.

HABENARIA TRIDENTATA. Frequent in an open bog south of Guelph.

HABENARIA LACERA. Common in an open bog south of Guelph.

SALIX AMYGDALOIDES. Very common in Wellington Co. and wherever I have been in southern and south-central Ontario. In the southern portion of Wellington Co. it outnumbers *S. nigra* twenty to one. Usually passed over for *S. nigra*, but easily distinguished by the leaves being glaucous beneath instead of bright green as in *S. nigra.*

SALIX SERISSIMA. Fern. Rather scarce in southern Wellington. A very distinct species (*Rhodora*, Jan., 1904) recently separated from *S. lucida* by Dr. Fernald. The capsules of this species do not dehisce until late in October or the beginning of November, while those of *S. lucida* do so in June.

SALIX PURPUREA. Rare. A shrub near Puslinck Lake, in the south of the county.

SALIX SERICEA. Our most abundant willow.

SALIX PETIOLARIS. Scarce.

NYMPHÆA RENIFORMIS. Common in Puslinch Lake.

ADLUMIA CIRRHOSA. Scarce. Rockwood, Ont.

LEPIDIUM CAMPESTRE. Scarce.

LEPIDIUM INTERMEDIUM. Our common *Lepidium.* I have not yet found *Virginicum* here.

BARBAREA VULGARIS. Scarce.

ALYSSUM CALYCINUM. Common along roadsides south of Guelph.

AMELANCHIER CANADENSIS ROTUNDIFOLIA. Common at Puslinch Lake.

PHUS VENFNATA. Rare at Puslinch Lake.

VICIA TETRASPERMA. Along the C. P. R. track near Killean, Ont.

VIOLA SELKIRKII. Rare.

LYTHRUM SALICARIA. Rare. At the west end of Guelph by the roadside.

CONIOSELINUM CANADENSE. Common in bogs and damp ground in the south of the county.

ANGELICA ATROPURPUREA. Common near Guelph and eastward in the county.

MONOTROPA HYPOPITYS. Scarce at Puslinch Lake.

MONARDA DIDYMA. Common along the Speed west of Guelph.

VERBENA STRICTA. Rare at Puslinch Lake.

VIBURNUM CASSINOIDES. Scarce.

LONICERA OBLONGIFOLIA. Rare at Puslinch Lake.

LACTUCA HIRSUTA Common at Puslinch Lake.

AMBROSIA TRIFIDA. In a yard in Guelph.

SOLIDAGO PATULA. Verv common at Puslinch Lake.

SOLIDAGO NEGLECTA. Very common at Puslinch Lake.

BELLIS PERENNIS. Mr. Sunley's lawn, Guelph.

ASTER SAGITTIFOLIUS. Frequent.

POLYMNIA CANADENSIS. In two localities near Guelph.

CARDUUS NUTANS. Common in some pastures and in places along the roadside near Guelph.

MEETINGS OF THE ENTOMOLOGICAL BRANCH.

Meeting No. 20 was held at Dr. Fletcher's rooms on Feb. 2nd, 1905. The chairman, Dr. Fletcher, opened the meeting with an address on the use of Insects in Nature Study, pointing out the difficulties of using and preserving such small and fragile objects. He advocated the examination of specimens out of class and the teaching in class from enlarged charts. He opposed strongly the passing of specimens around an audience while a speaker was delivering an address, on account of the confusion thus caused. Suggestions were made as to species of common insects which would be particularly suitable for study by students, each of whom should have the same insect under consideration at the same time. Insects mentioned were the Clouded Sulphur butterfly (*Colias philodice*) of which eggs could be obtained easily by enclosing a female in a gauze bag over a plant of white clover, planted in a flower pot. Each students could easily provide the food plant and secure the egg laying female. The Camberwell Beauty, the Small Tortoise-shell, the Graptas and Cabbage White butterflies, all of which could be easily obtained and all of which had short life-histories were also recommended.

Mr. D. A. Campbell in discussing the address gave his experience of ten years in teaching natural science and nature study. He had noticed the same difficulty of confusion in the class but believed in making the students examine the specimens very carefully and thought that they did this better when in class at a specified time than outside whenever opportunity arose. Another difficulty was in finding enough specimens for the whole class to examine at once.

Mr. Arthur Gibson read a paper describing the life-history of *Eupithecia interruptofasciata*, a small geometrid moth which he had reared from larvæ found on *Juniperus communis* by Mr. W. Metcalfe, at Hull, Que. Specimens were exhibited.

Mr. W. Metcalfe described the finding of 42 specimens of *Pachyta rugipennis* which he had taken upon a dead pine tree on May 29 last. The females were ovipositing and every one of these had about half a dozen males in attendance. This is an extremely rare insect and had never previously been recorded from Ottawa A few days afterwards Mr. Metcalfe revisited the tree but could not find a single specimen.

Mr. Jos. Keele gave a most interesting account of an expedition made by him during the past season along the Mayo Lake and in the valley of the Mayo River, Yukon Territory, describing the animals and fishes there observed. Among the insects brought back by Mr. Keele was a beautiful specimen of *Papilio machaon*, var. *aliaska*, and a rubbed but undoubted specimen of *Eurymus boothii*, which answered exactly to a figure of the species published by Mr. H. J. Elwes, in the Transactions of the Entomological Society of London, part III, 1903.

Mr. C. H. Young, exhibited a box of exquisitively mounted geometers taken during the past summer at Meach Lake, Que.

Mr. Andrew Halkett showed specimens of the pupæ of the Tomato Sphinx and casts of some dragonfly nymphs, including *Didymops transversa.*

Mr. J. W. Baldwin referred to insects imported with bananas and showed specimens of cockroaches thus brought to Ottawa.

Mr. Norman Criddle, of Aweme, Man. was present and joined in the discussions.

Meeting No. 21 was held at the residence of Mr. W. Simpson on the 16th Feb., 1905, Mr. Simpson in the chair. The first half hour was pleasantly spent examining the chairman's large collection of local coleoptera, which comprises many rare species. Mr. Simpson, while the cases were being examined and passed around, drew special attention to the more interesting specimens and gave notes upon their capture.

The advisability of enlarging the Ottawa district for investigation by members of the Entomological Branch was discussed and the general opinion seemed to be that the limits as shown in the Geological Survey Map of Ottawa, of which a large number had been purchased by the Club, were sufficient for present requirements.

Mr. J. W. Baldwin, showed, among other specimens, a beautiful form of *Calloides nobilis*, which he had taken at Ottawa last summer, also some orthoptera and bees.

Mr. Arthur Gibson showed a complete collection of the Ottawa Halisidotas and promised a paper on them for the next meeting.

There was an interesting discussion upon the habits of Gordius and Mermis, and in speaking on this subject Dr. Fletcher mentioned that both were treated of as parasites of locusts in the annual report of the Entomologist and Botanist to the Dominion Experimental Farms, for 1896, at page 238.

Mr. A. Halkett spoke of the parasitic worms to be found in fishes, and referring to imported insects showed a specimen of the large cockroach, *Periplaneta americana*, which had been brought to Ottawa in a bunch of bananas.

Mr. W. Metcalfe showed a collection of Hemiptera many species of which where new to the Ottawa list, and of which he had recently received the names.

Dr. Fletcher exhibited a box of specimens containing many rare and interesting species, among others *Sphinx canadensis*, taken at Ottawa last season at the unusually late date of Aug. 12, also a fine specimen of *Sesia titan*, taken at Sydney, C. B., by Miss Margaret Brown, of Halifax. Specimens of *Termes flavipes* winged and apterous, from Victoria, B.C., were examined with interest by all present.

Mr. Norman Criddle, of Aweme, Man., showed, among other rarities *Pœctes occulatrix*, which he had taken at Aweme on the 20th June last.

Meeting No. 22 was held at Mr. Halkett's house, Mr. Halkett in the chair. The chairman opened the meeting by drawing attention to a neatly mounted collection of conspicuous insects put up on tablets in an original method, which showed the specimens off to great advantage. There were in this collection many specimens which Mr. Halkett had reared from the larva or egg, and concerning which he gave many interesting notes.

Dr. Fletcher showed two cases of insects such as were prepared in the Division of Entomology, for examination by farmers and fruit growers. Each species was represented in all its stages of development together with its work, and parasites. In these cases were such well known pests as the San Jose Scale, the Variegated Cutworm, and other allied species, Tent Caterpillars, Fall Webworm, and White Spotted Tussock Moth. A description was given of the habits of the Black Sand wasp, *Ammophila luctuosa*, and the way in which it hunted for and carried off cutworms and other larvæ. Mr. Geo. Holland and Mr. Norman Criddle, had both studied these insects and Mr. Criddle mentioned that he had seen in Manitoba on one occasion the same or a similar species carrying off a large sphingid caterpillar. Referring to the Tent Caterpillars, Mr. Holland attributed their sudden disappearance to a severe frost in May, which destroyed all the foliage of the trees upon which the recently hatched caterpillars were feeding, and which extended over a vast area in North America. This view was agreed with by most present who recalled the peculiar condensed growth on some trees that year, where the young twigs, of the new growth, had been destroyed by the frost.

Mr. Gibson read a paper which he had promised at the last meeting on the three species of *Halisidota* which are found in the Ottawa district, and gave much information on the habits of the common but handsome caterpillars of these insects.

J. F. for Sec.

BOTANICAL BRANCH.

On January 26th the following members and friends of the Botanical Branch met at the residence of Mr. A. E. Attwood: Messrs. J. Fletcher, J. Macoun, R. B. Whyte, W. T. Macoun, T. E. Clarke, J. M. Macoun, D. A. Campbell, R. Cameron, W. C. Ewing, J. C. Spence and Norman Criddle.

The greater part of the evening was spent in considering the obstacles to the successful teaching of Nature Study in city public schools. The following difficulties were pointed out by the leader:

1. Lack of time. The curriculum is already crowded, and public opinion is declaring itself in favor of greater thoroughness in the old staple subjects.

2. Lack of material and appliances for study. As is the case with the other two new subjects, Domestic Science and Manual Training, the work must be done by the pupils individually in a place with the necessary equipments. A Nature Study laboratory is as necessary to the successful teaching of elementary science as is a workshop in the teaching of manual training.

3. Lack of definiteness. An educationist has said that the teacher tolerates the product on account of the process, and that the pupil tolerates the process on account of the product. As things are at present, there is no tangible product for work done by the pupils. Even teachers lack a clear conception of the scope of the subject. Nature Study requires to be defined in a way that will appeal to all.

4. A cause of disorder. The frivolity often observable in a large class of small children during a lesson in Nature Study tends to demoralize the class. The orderly freedom necessary to good work in mutual investigation is a difficult condition in classes of forty or fifty young pupils.

5. Lack of popularity. By actual vote of over 200 pupils, it was ascertained that Nature Study is not liked as well as are the ordinary subjects. Unpopularity of any school subject is due either to its essential unsuitability or to the unattractiveness of its presentation by the teacher. There is little doubt that the latter is the chief cause for the present lack of popularity of Nature Study.

All the teachers present, including Professor Macoun, who taught school for many years, felt the force of the difficulties mentioned ; the latter declared it to be his conviction that Nature Study would soon be consigned to the limbo of exploded educational fads. Dr. Fletcher was much more optimistic, and believed that the movement would have a permanent effect on the character of the work done in the schools of the future. Mr. J. M. Macoun thought that a competent supervisor of Nature Study should be appointed. Mr. Whyte expressed himself as thinking that the matter of order in a school-room was unnecessarily emphasized. Mr. W. T. Macoun said that if a clear relation was made to the life of the pupil of the various aspects of Nature Study, there would be no lack of interest in the subject.

The very animated discussion was stopped in time to give the gentlemen an opportunity of examining the wonderfully accurate and exceedingly artistic pictures ot plants painted by Mr. Norman Criddle in water colors.

A. E. A.

The Botanical Branch met at the residence of Prof. Macoun, Feb. 9th, when all the members but two were present. A proposition to extend the limits of the "Ottawa District" for botanical purposes was discussed and the general opinion was that such an extension would add to the opportunities for work, as some of the Club's members spend the summer near Ottawa but still outside the present limits. Prof. Macoun drew the attention of the members to the very small cost of making a herbarium collection of plants—only $7 per 1,000 sheets. The mounting paper can be had for $5 per 1,000 sheets, printed labels may be had for $1.50 per 1,000, and another $1 pays for the genus covers.

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